# Cause and Prevention of Uneven Yarn

Reprint of Articles Which Appeared on the Discussion Pages of the SOUTHERN TEXTILE BULLETIN During December, 1915, and Which Were Submitted in Competition for the Best Practical Article on "Cause and Prevention of Uneven Yarn"

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# Cause and Prevention of Uneven Yarn

**Winner of First Prize**

By T. R. MORTON, Edenton, N. C.

It is not the intention of the writer to discuss this subject except from a practical standpoint. Cause and prevention of uneven yarn is a problem that we have to face more or less every day, and the only way to make an even yarn is to be on the lookout for small things at all

**T. R. Morton,**
Edenton, N. C.

times. To make an even yarn we must have a uniform staple, the carder should get out his mixing and grade his cotton, try to get the staple as near the same as possible, open as many bales at one time as the space in opening room will permit. Have the man whose duty it is to feed the hopper to keep this machine about two-thirds full at all times. This may seem too small a matter for some to pay much attention to, but if we expect to get an even lap on the beater we must have an even feed from hopper. The breaker laps should be weighed two or three times each day and kept as near one weight as possible. Close attention should be given to the pickers as it is very desirable that we make good even laps. Do not allow finished laps to vary in weight over 1-4 of a pound either way. If they are too light or too heavy have picker man to set them back and run over, or the card sliver will be uneven.

**Cards.**

The cards do not receive the attention by some that they should. Bad work made on these machines will show itself during each process. The cards should be ground every 15 or 20 days, with good grinding emery, the grinding rolls should be covered with new emery after 10 or 15 cards has been ground. If we expect the cards to turn off a good even sliver free from foreign matter we must keep the wires sharp. The licker-in should be kept in good shape and set as close as the staple will permit. A lot of uneven work is caused on the cards from split laps. If the lap splits and runs into the card double, the sliver will be too heavy. The card hand should be watched very closely and made to get all singlings or doublings out of cans on front of cards. Keep the cards clean so the dirt and trash won't get into the good stock. If the card hands let the sliver cans get too full the sliver will be stretched and be too tight. When stripping cards a good idea is to strip every other card after these have run about an hour, then finish stripping. The sliver will run lighter when the card has just been stripped than after the card has been stripped awhile, so if we only strip half the cards at one time, we only get half the light sliver that we will if we strip all cards together.

**Drawing Frames.**

Drawing frames are the simplest machines in the mill, for that reason they receive less care. These machines should be looked after very carefuly. The rolls should be kept

in good condition and properly oiled. The stop-motion should work perfectly or we will get light and heavy sliver. If a sliver breaks on the back of frame or cans run empty and the stop-motion works a little slow, we will have 5 ends up instead of 6 and the sliver on the front of machine will be 1-6 too light, or if an end is lapped on the back of frame for two or three inches we will have 7 ends up instead of 6. The sliver on front of frame will be 1-7 too heavy. By the time this sliver reaches the spinning frames it will be stretched several inches and the yarn will be uneven.

Keep an eye on the drawing hand when he gets behind and see that he don't slip cans of sliver from the front of first drawing to slubbers in order to catch up quickly. See that all parts of machines are oiled at the right time, and that the weights are hung right and that there is plenty of weight on top rollers. See that top and under clearers are picked clean once every hour. Keep all bad rolls out of frames; don't allow rolls to stay in frames that need varnishing; don't allow the drawing tender to let the cans get too full on front of machine, as this will stretch the sliver. If you have can stop-motion see that it is in working order. Size the drawing sliver at least 6 times each day, and don't fail to change the draft gear if the weight isn't right. All numbers should be kept on drawing and if watched closely at this point it will hardly ever become necessary to change draft gears on fly frames or spinning frames.

### Fly Frames.

Slubbers, intermediates and speeders must receive proper attention if even roving is to be made. It is possible for the picking, carding and drawing to be almost perfect and then bad, uneven roving to be made on fly frames. The rolls on fly frames should be cleaned once each day and oiled regularly. The bottom steel rolls should be taken out of frames and cleaned with card clothing and whiting once a year. It is necessary to keep the flutes clean on steel rolls if even work is made. The roving must have enough twist so it won't break in creels. If too soft, it won't have strength enough to pull itself and the results are the roving will stretch and this will cause thin places. The tension on fly frames is very important and should be watched very closely by the overseer, for if tension is too tight roving will be uneven and full of thin places, if too slack it will wind too loose on bobbin and make a soft bobbin, and this will break-back and stretch in creel at next process. This means uneven work. Special care should be given to the creeling of intermediates and speeders, as bad creeling means uneven work. Every doubling and singling made on fly frames means bad running spinning and weak and heavy yarn.

### Things to Watch Around Fly Frames.

See that the roving travis works freely and makes full stroke. Have frame lined and leveled once ever year. Keep all worn spindles and bolsters out of frames, have stops oiled every two weeks. See that no roving is wound around the back steel rolls as this will raise the top leather roll and stretch the roving. Do not let frame hands run frames too full, as this will chafe and cut the roving. Keep all bad bobbins off spindles as a bad bobbin will vibrate or shake and make the roving uneven. Have section men to keep all bad rollers out of frames as a bad roller means bad work. Never put a new roller in frame without oiling it, nor allow frame hands to fan off, as the flyings will get on the stock in process and make lumpy roving. Have spindles oiled every Monday and Thursday. We must pay attention to the small things if we make even work.

### Draft in Card Room.

If good running work and even roving is made then drafts must be right at each process. For a 4.50 hank roving on speeders made from from 1-inch staple cotton, would advise the following drafts: 98 on cards, 6 on drawing, 4.35 on slubbers, 5.35 on intermediates, 6 on speeders. The writer has tried this and has gotten good results.

### Spinning Department.

Every thing in the spinning room depends on how clean we keep the frames. As to what kind of yarn we turn out, the carder may make almost perfect roving and if the management in the spinning doesn't watch and look after the cleaning at this point, bad yarn will be the result. The frames should be lined and leveled once every year. The roving creels must be level and in

line so there won't be any undue pull on the roving. The oiling is a very important factor in this department. Special attention should be given to the top rolls which should be oiled at least twice a week. Spindles should be oiled every three weeks. A dry spindle will vibrate and make uneven yarn.

**Banding.**

The bands should be tied on by a particular person and one that can be trusted, as a slack band will reduce the speed of the spindle and make soft, uneven yarn. The bands should be made of roving and weigh about one pound to 120 bands. Don't make bands out of yarn, as a yarn band will stretch and not come off when it first gets slack

**Things to Watch and Do in Spinning Room.**

Spindles should be plumbed and set in center of rings, guide wires set to top of spindle. Keep all bad spindles and bolsters out of frames. Don't use guide wires that have grooves worn in them. See that roving creels are in line and perfectly level. See that roving sticks are in good shape and that the bottoms are not worn blunt, as they must turn freely or the roving will be stretched. Do not allow bad or worn bobbins to be used as a worn bobbins will vibrate and make uneven yarn. Have roving creels wiped once each day, for if lint and cotton are allowed to collect around the end of the roving stick, it will be hard to pull and the roving will be stretched. Have all top rolls picked every day for dirty rolls make more uneven yarn than anything else in spinning. Have some one to inspect all rolls once a day and see that all bad or worn rolls are kept out of frames as a bad roller can't make any thing but bad and uneven yarns. Have guides run or wiped out every 30 minutes. If lint is allowed to collect at this point, it will catch on the yarn and show up in lumps, and these lumps will hang in the thread guides on winders or spoolers and stretch the yarn. Have all travelers changed every 3 weeks, as a worn traveler will cut and chafe the yarn. Do not allow roving to wind around the steel rolls and stay there, as this will raise the top leather roll and make the yarn uneven, keep all lumps of cotton out of the trumpets as this will make the roving draw hard and make the yarn weak. Keep all worn rings off of frame for good even yarn cannot be spun on a bad ring. Don't allow the spinners to let 3 strands of roving run into one end where two is all that is necessary. Make doffers piece up as soon as frame is started after doffing, as a lot of doublings and choked rolls will be saved by this. If the yarn is made right in the carding and spinning departments we will not have much trouble in the other rooms. If we will watch the little things the big ones will take care of themselves.

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**Winner of Second Prize**

By R. V. PORTER, Batesburg, S. C.

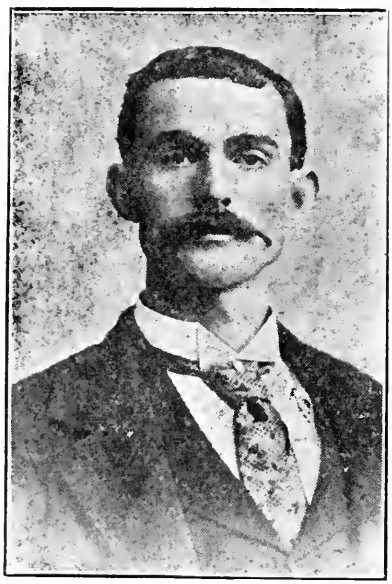
This subject has probably been studied since the first cotton yarn was spun and improvements made before my time ,and I can see where great improvements have been made in the past twenty years, but at the present time with all improved machinery and all the graduates of the textile schools, I failed to know of a mill that is making perfect even yarn. Anyway, we all are trying to get it better.

However, some men can make more even yarn than others. Some men can make a more even yarn at one mill than he can at another, even if both mills be equipped alike, if other conditions differ.

Sorry cotton will make uneven yarn, therefore good stiff land should be selected for cotton. The land should be prepared deep, in the month of January or February. It should be planted with good seed from a good even grade of cotton. The cotton plant should be cultivated shallow, to prevent injury to the roots, and fast enough to keep it growing, for should it get stunted for the want of cultivation or by growing it too thick on the land we will have a sorry cotton, which will not work well. It will not draft well, therefore it will make uneven yarn. Cotton should be picked from the burrs as free from trash and dirt as possible. It should be ginned very carefully, not to let it

get cut or taking off small pieces of seed with the lint, for gin-cut cotton or cotton that is ginned too close, leaving small parts of seed and motes in the lint, will not work even and will make uneven yarn.

A cotton grader is a valuable man to a mill if he will attend to his business. He should see that the mill gets what it pays for and not allow just any old thing to be dumped on the mill, even if he be a good friend to the seller. But with a good grader it is best for the superintendent or the overseer of carding to inspect every bale of cotton that is brought to the mill and reject or lay aside all bales that are not up to standard, and should he find sev-



R. V. Porter.
Batesburg, S. C.

eral bales which he would with the ordinary grader, in a short while he would have enough to run the mill a week. Then if he wished to run the rejected cotton the overseer would have time to adjust his machinery to suit it and could make a more even yarn with it than if it had been opened up all together and run into the picker room by the outside man without the knowledge of the overseer of carding until it was giving trouble. The more even the cotton the more even will be the yarn. Therefore superintendents and overseers of carding should have more sayso about looking after cotton than some mills allow them. Furthermore we can not get even yarn with good cotton mixed with a poor grade of short punk cotton for it will not draft even and a sorry punk cotton will fly out while being run through the machines and cause the yarn to be light and uneven. Before starting to open one should have plenty of cotton to start with. Thoroughly mix it in the opening room twelve hours before putting in the breaker feeders, which should be kept as near half full all the time as possible. Otherwise the breaker laps will vary several pounds, and this will cause uneven yarn. We can not expect even work from the first pickers unless the laps were even to start with, nor with the breaker laps splitting or a cone belt slack enough to slip or a lap apron slipping. Sometimes a clutch gear or a knock off gear will cause a lap to vary and should be looked after as well as the evener. The evener belts and all of its attachments should be looked after, kept clean, and well oiled, so each part can be depended on to do its duty when the slightest variation takes place.

When putting a set of laps on pickers I think it well to start with two or four sizes. Say 1-4, 1-2, 3-4 and full, or half of them 1-2 full and the others full which will prevent them all running out at once, which will give the tender more time to replace them and will make a more even lap than if all had been put on full at one time to run out together. When replacing new laps they should be pieced in and not lap one end of the lap over the other. If so it makes a heavy place and is uneven. Lap racks on the machine should be kept level, or otherwise one end of lap will be larger than the other and uneven.

Now we come to the finisher. This is one place where I think any mill that expects first-class work should allow his carder to have a competent man, one who can be depended on at all times to weigh the laps and see that every thing goes right, for if the weights or numbers on the finisher are not right there is no other to remedy it and the yarn will be uneven. Every yard in a lap should be made to weigh the same as well as to have the laps weigh alike.

**Carding.**

Cards should be kept in good or-

der. Use the best of clothing. Keep them properly ground and set to suit the stock being carded, so as to lay the fibers straight and get out as much motes and trash as possible, for the better cotton is carded the more even it works. One can not do good carding with sorry clothing, or wornout clothing or with flat places being mashed on the clothing, by letting things get into the card that should not. When replacing a lap it should be pieced in and not lapped over the other end as some tenders do, for it will cause a heavy place in the sliver and uneven yarn. Coiler heads should be looked after and see that the spring, or bonnet tongue, which holds the trumpet down in the coiler head is not broken. If this spring or bonnet tongue is broken the card end or sliver will run slack, get onto the floor and if the floor is dirty it will likely take up all the loose waste it comes in contact with, which will cause it to be uneven. The tender will probably put some cotton under them to take up the slack. Will make some run tighter than others. Then we have uneven sliver. All stripper plates should be set the same so as to get the same per cent of strips from each card. If set close you will not get much waste while if set far off the quantity will be larger, while the sliver of different cards will be uneven if not set correct. All card and drawing cans should be kept smooth inside and the rim of the top. They should not be kicked around and bent in as the sliver will not come out free. It will sometimes break or stretch, if so, we have an uneven sliver when it takes place.

**Draw Frames.**

By all means keep the stands, roll necks and rolls, spoons and stop-motions in good condition, for a crooked roll will make an uneven sliver. A worn neck or stand will make an uneven sliver. A dirty bottom roll will make an uneven sliver and if stop-motions fail to work properly we have singlings which will cause uneven sliver. Stop-motions or spoons should work so as to stop the machine as soon as the card sliver leaves it. Leaving enough end for the tender to piece to instead of sticking the new end in with some times a yard or so of extra card sliver going through the rolls. If so, we have a heavy place in the drawing sliver which will cause uneven yarn. Drawing boys should be watched. Sometimes they may have an end to run slack. Instead of reporting the trouble, they will put some cotton in the stand between the top and bottom rolls which will stretch the drawing and it will be uneven.

Intermediates and speeders should be kept in good order as well as slubbers with good stands, good bottom and top rolls, remembering that a worn neck, a worn stand, a crooked roll will make an uneven roving. Trumpets that are not uniform, or bent, or half choked will also cause roving to be uneven. Tention being too tight will cause roving to stretch, which will find its way into uneven yarn. When replacing roving in creels it should be spliced or broken very short for this is one place where a great deal of uneven roving is made, caused by a frame hand who usually starts at one end of frame to replace the roving in the backs. Sometimes they let several bobbins run out before replacing them. Then singling is being made. They very often let from one to two yards of extra roving get in, which causes it to be heavy. Then if the ends, which have the singling in them, begin to run slack they will sometimes run an extra end in it from behind, which will cause light roving and heavy roving as well as uneven roving to be on the same bobbin for the spinning frame.

I will mention a few causes that will make uneven yarn while being spun and the prevention is to keep everything about the frame in first-class condition and clean, namely: uniform trumpets, creel stands being broken or misplaced, roving skewers being broken or bruised at bottom, while bobbins are resting on them preventing an even pull. Spinners replacing roving, allowing from six inches to two yards of etxra roving to run in instead of breaking it off short, worn stands, bad rolls, crooked steel rolls will make an uneven, weak yarn. If ring rails are badly out of level or rings not properly placed in ring rail, the yarn doesn't seem to have the same tention and is to some extent uneven. Levers out of level or resting on creel boards will make yarn uneven also. Dirty rolls, especially with a thin coat of cotton or roving getting around back or middle steel roll will cause uneven yarn also.

A spindle dry for the want of oil, or a spindle which is badly out of plumb, or a guide wire which is out of set, will cause the yarn to be uneven as well as weak.

If draft gears are set too deep, the rolls do not run steady, therefore the yarn is uneven. If travelers are too heavy the yarn is stretched to some extent and is uneven; and if light enough to be continually whipping against the separator it is uneven also; if roving is drafted too long the yarn is uneven; if steel rolls are not properly oiled they are inclined to quiver and do not draft the roving even, therefore the yarn is uneven. If spinners let two rovings run in where it should be one, or three where it should be two, or fail to pick out all the doublings made on the speeder the yarn will be heavy and uneven.

## Number Three.

By L. C. LANGSTON, Louisville, Ky.

There are numbers of things to contend with to keep from making uneven yarn. The man who does the buying and mixing must be familiar with his job and be a good judge of cotton. In selecting stock for a mixing, every bale should be examined to see that you have practically an even staple. There should not be bales with 7-8 inch staple

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mixed with 1 1-16 inch. If this be the case there is certain to be uneven yarn.

Before we go into details with the different machines, I would like to say right here that we must have them properly oiled and cleaned. All gears must be in good condition and set properly in order to do away with lost motion, which is a common cause of uneven yarn.

Open as many bales as space will allow (the more space the better) and take a small portion from each bale and feed to bale breaker. The cotton is then blown to picker room. Taking for granted we have a mixing with practically the same length staple, we will now start with the breaker. Keep the hoppers about 3-4 full all the time. If you let it run down to say 1-4 full, you will produce a light lap, which makes unnecessary work for the eveners on the next process. Weigh breaker laps as well as intermediate and finisher. Cone belts should be run in middle of cones so as to allow room either way for belt to shift in case of necessity. See that your aprons do not slip and if possible have a chain drive on aprons. In creeling pickers have two full laps and two half full laps on apron at same time, in order to get as near as possible the same weight on aprons. Keep feed rolls free from laps. Do not run beaters too fast. Keep chokes out of screens. Regulate fan dampers as they need to be, if you don't there will be split laps, which is an evil towards making uneven yarn. Keep your beater blades in good conditions and do not let them get blunt by any means. Have a good, honest man to run finishers and if laps do not weigh within 1-4 of a pound each way, they should be set back to be run over, especially where you have good stock and want to make fine numbers.

We will now pass to the card, which is sometimes called the soul of the mill. The card grinder should be a man of good judgment

and sensitive to touch. In setting up a card, the grinder should be careful to get his settings parallel, for instance, if the flats are supposed to be set to a 9, they should be that way on both sides, not to a 9 on one side and a 12 on the other. If the fillet is loose on cylinder and doffer you cannot get a close setting. The fillet should be taken off and rewound or put new fillet on. For instance, if you had a cylinder with loose fillet on one side and tight on the other and would undertake to set flats to a 9 or 10, the fillet would raise up on the loose side as soon as cotton is put through and would cause flats and cylinder to face, thereby causing yarn to run flats off.

The front plates on all cards should be set the same in order to take out the same amount of toppings. In putting in new laps, card hands must not lap ends too much as this causes thick places in yarn. After a card has been stripped the sliver should be taken down and not put up until the cylinder has filled up enough to cause the sliver to get back to its normal condition. This is done to avoid thin places or uneven yarn. Do not allow card hands to use flaps, as it causes a certain amount of trash to get in sliver, thereby causing lumpy yarn. There should be no stretch in web between doffer and calender roll. To remedy this is to put on the right compensating gear. Have all your trumpets the same bore.

Where there is combing you should see that the doublers are in good shape. Keep the sliver plate polished nicely and by all means have your stop motion in order so that when a sliver runs out or breaks down the machine will stop immediately and not allow a single to get through. See that your rolls are kept clean and free from laps.

The ribbon lapper is a good place to produce uneven yarn. If you don't watch the help closely they will raise the stop motion and allow singles to go through. For instance if you have a four-end lapper and one end is out, you have 25 per cent lighter stock and this will never be overcome. See that the rolls are in good condition and free from laps.

Keep half laps on combers in good condition. Leather detaching rolls should be kept well varnished in order to have a good grip on stock when piecing up. The nippers should grip the stock tightly at all points on cushion plate. See that the bearings or brass detaching rolls are not worn. If they are the web will appear to be rough and uneven and will cause lumpy combed sliver. Beware of singles on combers. If any are made see that they tender pulls them out of cans. Do not let cans run too full as this stretches sliver.

Cut drawing is something to be watched very closely as this is one of the main causes of uneven yarn. Cut drawing is made very easily where metallic rolls are used. The arbors will become worn, allowing the flutes to go too deep and will actually grind the fibres into pieces. Where arbors are worn the remedy is to buy new ones or have old ones repaired. Metallic rolls should be scoured at least every two weeks if not more often. Where leather rolls are used they should be varnished at least once a week. See that there is no stretch in sliver between front rolls and calender rolls. If this is not observed you will find thick and thin places in yarn. Change compensating gear to remedy this. Keep clearers picked clean so as to kep out slugs.

We now come to the first twisting process in the mill and that is slubbing. If we have a smooth, even drawing sliver it can be ruined very easily by not having the proper draft, twist, lay and tension. A good draft for slubbers is between 3.5 and 4.5. There should be just enough twist to pull the bobbin at the next process. If there is too much twist it will not draw out properly and will cause hard ends and unnecessary piecing.

The roving should be laid on bobbin just as close as possible, not to ride. We now come to the tension, which is the most important of all and is a hard thing to keep regulated. It is easy to regulate but is hard to keep the frame tenders to let it alone after it has been regulated. Frame tenders should not be allowed to take up or let off on ends. If any thing is to be done is to have section man change tension gear. At the beginning of a set there should be proper bottom cone gear on so that the ends will not start up too tight or too slack. After the proper cone gear is on, put the proper tension gear on to cause ends to run same

throughout the set. Taking up on ends does not only stretch roving (causing thick and thin places) but causes tangled bobbins and sometimes causes frame to run over which means lots of unnecessary piecing. Do not run bad rolls. See that the roving traverse is making the proper traverse. If it stands in one place grooves will be made in roll, which will cause lumpy slubber roving. Do not fan off machine and keep clearers picked good so as to keep out slubs. Another thing that is overlooked and that is piecing up ends. The tender should not twist ends too hard as it will cause hard ends on next process and this means uneven yarn.

The above paragraph will apply to intermediates, speeders and jack frames with the exception of draft. A good draft for intermediates is 4 to 5, speeders 5 to 6, jacks 6 to 7. Watch skewers and skewer sticks and see that the sticks are not blunt.

Suppose we have good, even roving ready to be spun. It can easily be turned into uneven yarn if certain things are not observed. First, we must have good skewers and skewer sticks. Second, we much have good rolls and keep them well oiled. Third, the right traveler should be used and spindles must be plumb. No fanning off should be allowed as slugs are certain to get in yarn. Poor piecing is another evil that produces uneven yarn.

## Number Four.

By G. L. MEACHAM, West Durham, N. C.

The "Cause and Prevention of Uneven Yarn" is a good subject, as we will have it until we commence in the fields where the coton is grown and

**G. L. Meacham**
Durham, N. C.

give it more attention in the opening, mixing and picking rooms, than most mills do. One more trouble in lots of Southern mills is the buying of the cotton. Some mills buy cotton in small lots from, say the Carolinas, also Georgia and Alabama and probably Mississippi. This cotton is delivered without being graded, and is just stacked in the warehouse. The consequence is that the carder has to take it just as he comes to it. More than likely he will have cotton from different states in process at the same time not properly mixed, which will make uneven numbers.

Now we will take the opening, mixing and picking. Some mills have room enough to open one day's run ahead, and some have not. Some mills make down a mix and run it the next day, while other mills have not room and mix only one-half day ahead. I prefer the former. Some mills have to open and run right off the bale. We will first take the mill that has the room to mix one day ahead.

First, if you are running 20 bales a day, and using cotton from 4 different sections, bring it out and open 5 bales from each lot of cotton. Take a layer of 50 pounds of each bale in the first lot and start your mixing. Go to the next five bales and do likewise. Keep on going around until you have mixed the 20 bales. In the meantime, take all of the waste which you have on hand, and work it all through your mix in thin layers, just as you put down your mix.

Next comes the hopper. Make the man who feeds the cotton commence on one side of the mix, and beginning at the top of the pile, go

to the floor. Do not let him pull it off the top, but feed straight down through the mix, and by doing this you will have cotton in your hoppers from all the 20 bales, also some of the waste. You will deliver to the next process, a nice, even grade of cotton. Should you not have room to make this mix and have to run right off the bale, and you have cotton from 5 different sections, then open 2 bales from each section, and have the hopper man feed from all these bales. See that he keeps cotton in the hopper from all 10 bales at the same time for by doing this you will get a good even mix, but not as good as the first. See that hoppers are kept from 2-3 full to full all the time, and you will get a good, even breaker lap. If the hopper man fills the hopper full and then sits down and sleeps until the hoppers run empty, then refills them you will have uneven breaker laps, which will make uneven yarn.

The breaker should make laps so that when 4 of them are put on the intermediate lappers, your evener belt will run in the center of the cones. Now for ordinary cotton and numbers the porcupine beater on the opener should run about 500 to 600 turns per minute. The breaker 2-blade beater should run about 1,200 to 1,400 turns per minute and should be set to the feed rollers to about 1-4 inch, and to the grid bars, at top of circle, to about 5-16 inch, at bottom circle about 5-8 inch.

Next we come to the intermediate lapper. Never let the lappers run out, or apron slip, or you will have uneven work. Keep four laps on apron. See that apron does not slip, that machine is well oiled and cleaned. Replace all worn gears and bearings and worn journals with new ones. Draft from 3 1-2 to 4 inches and run the 2-blade beater about 1,200 turns and the fan about 700 turns. Set beater to feed rolls about 3-16 inch, set beater to grid bar at top of circle to about 1-4 inch, at bottom of circle about 7-8 inch. This will give a nice, clean lap for the finisher.

Next comes the finisher lapper I think a draft of from 4 to 4 1-2 inches is all right for the finisher. If you are using a carding beater, run fan 800 turns per M. Set beater to feed roller to about 1-8 inch. Set beater to grid bars at top of circle to about 3-16 inch, at bottom of circle to about 3-4 inch, and if you set back all laps that vary over one-half pound from the standard weight, you will deliver a good, even lap to the card, which if handled properly, will make good even yarn.

We will now take up the cards. It must be kept sharp and stripped when necessary. Some men strip twice a day and some 4 times. I am carding a 11-ounce lap, making a 60-grain sliver and I strip my cards 4 times a day. Will give a good setting for 7-8 to 1 inch cotton for coarse numbers from 9s to 14s. Set feed plates to 10, licker-in to cylinder to 7, top mote knife to 7, bottom mote knife to 10, top flats to 10, doffer to cylinder to 7, doffer to comb to 12, stripper plate to 17 at top and 22 at bottom, breast plate to 22, plates between licker-in and flats to 17 at bottom and 22 at top, licker-in screen to 34, under licker-in, main screen to 17 at back, 34 at center of card, 68 at front next to doffer. Now do not let the card hand put up the ends as soon as the card is stripped, nor allow him to let the laps run out, or you will have your wire bungled up on cylinder and top flats. Try and teach the card hand to lap the ends just as short as possible, say about 1 1-2 to 2 inches, otherwwise you will have a long doubling, and if you are drafting as much as 90 inches and the card hand doubles his laps 4 or 5 inches you will have about 360 inches of doublings, making uneven yarn. Also when the card is first stripped the sliver or roll is several grains light. See that the card hand or stripper lets the roll run 3 or 4 yards and break this off before piecing, or you will have light rolls, making uneven yarn.

Coming to the drawing frames, see that they are kept clean and properly oiled ,and that the rolls are correctly set for the grade of cotton that you are drawing. See that the drawing hands make proper splices and that they put the roll at the proper place before starting the frames. If they start a frame, then throw the end up, the chances are that you will have a long singling, making light yarn. For 7-8 to 1 inch cotton will suggest the following setting. First to second roll, 1 3-8 inches from center to center, second to third roll, 1 1-2 inches, third to back roll, 5 5-8 inches. The above is for a 68 to 70 grain drawing sliver. The front roll should not run over 400 turns, 350 being better to make

a good even sliver. See that the ends run slack. I do not mean sag too much, but they should sag the least bit. If they are run too tight the sliver is damaged and you will have weak and uneven yarn. Be sure and keep top and bottom clearers clean.

The slubber comes next. The first thing is to see that the slubber is well oiled and all gears are in good condition, that you have no lost motion and that rolls are properly set for the stock and numbers being run. See that the ends are not tight when the slubbers are first doffed, and started up. If so, you will stretch the roving, damaging the work and making uneven yarn. See that the slubber tender makes as short a splice as possible when creeling, or you will have lots of doublings, and just run enough twist in the slubber roving to make it pull off good without breaking back on the intermediate. See that the roving is wrapped the same number of times on each finger and that the tender does not run the doffs too full. If he does this, the roving will be stretched, and you will have weak and uneven roving to deliver to the next frame, which will make uneven yarn.

Now, we take up the intermediate and fly frames. Too much twist makes the roving run badly in the next machine. Use as little as possible on the intermediates. See that the frames are kept clean and properly oiled and that all fingers are wrapped the same number of times. Do not run the ends too tight or you will have uneven yarn. Try to keep same tension on all frames and keep the skewers all in good shape. If ony of them are in bad shape, they pull hard and you will have a light bobbin from that spindles, which will make uneven yarn. Some mills let the frame hands, when creeling, stick the ends in the rollers. They pull the other off, but they make lots of doublings. I prefer piecing the ends for if you run 3 inches of doublings in the intermediates, and you are drafting 5 inches, you have 15 inches of doublings to go to the fly frames, and if you are drafting 6 inches there, you have 6×15, or 90 inches of doublings to go into the spinning, and if you are drafting 10 inches, you will have 10×90, or 900 inches of uneven yarn which will be heavy. See that the fine frame is properly set and the proper lay gear and twist are used. I will not give the settings, as most carders have different settings and of course different hank roving and different grades of cotton require different settings. See that no singlings or doublings go to the spinning frame.

The spinning is next. You must set the rolls as close as possible to make a good even yarn, but not close enough to make cockley yarn. See that all worn roving and skewer sets are replaced with new ones and that there are no worn necks and loose joints in steel rolls. If worn, have them re-necked, for worn and loose ones make uneven yarn.

See that all worn rings are turned, or replaced with new ones and that the travelers are right. Do not get your travelers mixed, as that will cause bad work and uneven yarn.

Try to keep the humidity as near one thing possible. See that all are mixed. There are lots of carders and spinners today who don't know what draft and twist gear they have on. They trust to the section men to get out the gears and sometimes the latter are careless and mix the gears, uneven yarn being the result.

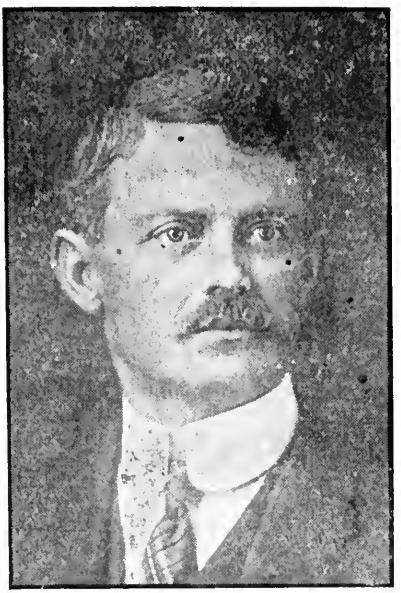
## Number Five.

By T. W. HARVEY, Cherryville, N. C.

The making of even yarn may be likened to the building of a large structure that is to carry great weight. We must start at the foundation of any great undertaking if we wish it to withstand the various storms that will be brought to bear on it, whether it be the delicate cotton fibre or the strongest piece of metal known to man. Hence we start to make even yarns by selecting stock suitable for the class of yarns required. After having done this, it is necessary to have a suitable and large enough room to open the cotton and thoroughly mix it. Poor mixing is one of the greatest faults of our mills today. Now the mixing of cotton does not consist simply of throwing great big pieces of cotton from the bales as they are brought in from the cotton house

into one pile, which is very often the case. The cotton should be opened and each bale tested for length and trash. After you have determined the average mix you are to make, have a small portion taken off each bale and thoroughly shaken out over a given floor space. Keep on trimming the bales in this manner until you have the lot all mixed, into a larger pile.

The man who does the feeding of the hopper or blowing system should be instructed to take the cotton



**T. W. Harvey**
Cherryville, N. C.

from top to bottom of the pile in order to get a small portion of each bale in every armful or boxful as the case may be. In this way you get an even mixture of fibres to start with, which will insure regular strength and even running numbers as far as the stock question is concerned.

Now we take up the picking department. Remember, the less beating you give the cotton the stronger and better the yarn will be. My experience has taught me to beat it just enough to get the heavy trash out of it. A two system (breaker and intermediate picker) will clean the cotton. Do not run it through the finishers just because you have them in the mill. If you have a three system picker room doing 2,500 pounds per day, convert your intermediate into a finisher and cut the speed down to 1,300 lbs. for each machine. If you have carding beaters, reduce their speed to between 1000 to 1100 R. P. M. I am reasonably sure you will get better results through your mill and make it easier for your cards. The picking department is only intended to clean the cotton and make it into an even layer convenient to transfer to the next process, the cards.

To get even yarn, the card clothing must be tight so as to allow close setting of the different parts of the card, cylinders, tops and doffer. To get a good even webb from a card, it is necessary to set the licker-in close to the feed plate and use a light lap. Run your doffer to get the required production, have licker-in to cylinder, top to cylinder and doffer to cylinder, set so you are not liable to face the clothing at any point.

Now we go to the drawing frame, that simple machine that any fool can run (so some mill men say), a machine that has caused more bad, uneven work in the mill than all of the rest combined. Why? It is so simple to run, nothing to do but put ends up at the back and take the cans off at the front when they get full. However, there is a lot more about the drawing frame than the average layman can understand. To get the best results from drawing frames they should be thoroughly cleaned each week and the top rolls examined. The adjustment of the weights should be carefully looked after, as it is absolutely necessary that each end of the top rolls have the same amount of weight. Now, the sliver guide at the back of the frames should be set just high enough to keep the slivers close when running and not allow them to separate and part of them sag down between calender rolls and front steel rolls. By keeping them as one wide ribbon coming through the rolls you can get the proper compensating gear on the frame and avoid any draft between the calender rolls and front rolls.

The draft question on drawing frames is what destroys more good sliver than any other point. Get your machine drafted properly if you expect to make even yarn. Light sliver and short draft at the drawing frames will show up in high class yarns, whereas if you use a long draft and heavy sliver, at the

drawing, your yarn will be put in as low class yarns.

The slubber is the first machine that puts twist in the cotton and like all others that proceed it, has four motions ,drawing, twisting, laying and tension. Close watch must be kept on the first and last two. First, the setting of the rolls to suit the stock, cleaning, oiling, etc., to keep the rolls moving freely. Above all things avoid long drafts with a sliver too heavy for the roll weights. As to the tension, see that the frames starts off right and never allow a hand to take up or let out the cone belt. If you have trouble with your frames jerking and stretching the roving, increase the width of the cone belt to 3 inches and change the bottom cone gear to give you the proper speed at the start of the set.

I will not dwell on the intermediates, nor speeders, as they require the same attention as the slubber, except this. See that the skewers are not blunt, which allows the roving from the slubbers to intermediates to be stretched in the creel. Keep sight of your drafts on these machines. Excessive drafts will make uneven yarns, and there is no remedy for it, not even short drafts, in the spinning room.

Now suppose we have observed all of the above very carefully, seeing that there is no carelessness in handling the stock from picker to speeder. Suppose that the oiling and cleaning have been done with care and intelligence, we will enter the spinning room.

In the spinning room we again meet the same conditions except on a differently constructed machine. Here the draft and rolls of the machine must receive the same attention as before and like work shall be performed with more strict attention on the part of the overseer and second hands ,as we have now to deal with the young people who make up the spinning room help. A boss spinner must make certain rules regarding the cleaning and oiling of rolls, the inspecting of same by an intelligent person. I find the best method is on Saturday when all is cleaned up to have the spinners place top clearers on top of the frames and then the second hands pass up and down each alley, inspecting the condition of them, and then and there remove or have removed, any roll which in his judgment is not making good work.

Now, Mr. Editor, there have been so many articles written on the management of the spinning room, some of which you have published and distributed in book form, that it would be folly for me to say anything that some fellow may say of, "I wrote that same thing for The Bulletin a year ago." So I will close with this short sentence: There are two things in the mill that make uneven work and that have ruined the product of many a mill. These two are **Draft and Tension.** I heard the president of the New England Manufacturers' Association once say: "Give me roving free from overdraft and tension strain, and I can make good yarn on a wheelbarrow." Now, I want anyone who reads this to understand that I do not overlook the twist question, but we all know there is no set rule for twist in the average American cotton, except the rule of common sense, and that is to put in enough tto carry it through to the next process without stretching it.

## Number Six.

By A. J. RODGERS, Blacksburg, S. C.

I am sending this for entry in the contest of "Cause and Prevention of Uneven Yarn."

Bad cotton or the weather never cause the numbers to mix, some light and some heavy, on the same frame or speeder as the case may be, for either will make them vary, all the same way, all heavy or all light.

To keep numbers even, it is essential to have an honest, well experienced man on the pickers, one that will not send laps to the cards that you do not want.

You should have a standard weight for your laps, and allow one-quarter pound variation on either side of standard and no more. All of the rolls on the picker should be clear of waste that catches on them. If allowed to run they will be inclined to stretch the lap, if on the calender rolls, but if on the feed rolls they will cause more stock to be delivered, and cause the lap to

have heavy places in it. The friction should not be too tight, or the lap will be stretched more in some places than others, and this will cause the numbers to vary. The grinder has a lot to do with the numbers varying too. He should have all of the cards set alike, so as to take out the same amount of motes, the same amount of flyings under the doffer, the same amount of toppings off the flats. Now some men will say this cannot be done, but I have found that it can be done. If there is more waste coming from some cards than others, the sliver will be somewhat lighter than it will be from those that are not taking out so much. If all the trumpets at the calender rolls are not the same size, the sliver will not weigh the same, and if the trumpets at the coiler are not the same size they will cause the numbers to vary. All of the gears on the calender rolls should have the same number of teeth, or you can not run the combs alike. Some will have to be run higher than others, and if all of the trumpets are not the same size the combs can not be run at the same height, and if the combs are not run alike the numbers will vary according to the amount of stretch that the sliver gets between the comb and calender rolls.

The drawing should be kept clean and well oiled. If the rolls are lapped with waste, they will cause more stock to be delivered than if they were not, and it will cause the work to be heavy, and if there is one end that sags more than any of the others, and comes down from this cause. The drawing tender will pack waste in between the top and bottom rolls in the stands to keep the end tight enough to keep it from coming down, but this should not be done, as it will cause that end to be heavy. The trumpets on the back drawing should be all of one size, and all of the trumpets on the second drawing the same on it, and the finished drawing trumpets should be all of one size. If all of the trumpets are not the same, those that are the largest will be stretched more than those that are smaller, and consequently will be lighter than the others. But if all the trumpets are the same size on one machine there will be the same amount of draft on each end between the calender rolls and the drawing rolls. The weights should be uniform and never allow some to be let down lower than others. All should be level and clear of raising levers, and not mixed, some of the heavier weights in front and some of the lighter ones behind. All of the lightest weights should be on the front roll. If not the numbers will not be even, and the cans should not be run too full as this causes the drawing to be stretched by the coiler and consequently become lighter at top of can than at bottom.

The slubber rolls should be kept clean and well oiled. Dry top rolls in the back will cause light work, but dry shell in front will cause the work to be heavy. Waste in guide trumpets will cause the drawing to stretch and make light work. The tention gear should be changed when the ends get too tight or too loose. Never let the slubber tender take up or let off, to keep the tention right, for he will take up too much and stretch the roving when he takes up on the rack to make the ends tight enough, and if they run too tight he may not let off soon enough, and the roving will be stretched before he lets off, and this will cause uneven numbers.

The intermediate and speeder rolls should be kept clean and well oiled, and all waste kept out of guide trumpets, and all skewers in good shape, or the roving will stretch on the ends that are choked in the guide or have a bad roving skewer or set. The tention gears should be right so that the help will not have to be taking up or letting off on the ends, or the numbers will not be even all through the doff. The spinning rolls, like the speeders, should be clean and well oiled. If the top back rolls are dry it will make the work light, and if the front rolls are dry or have waste on the steel rolls ,the work off that roll will be heavy, and you will have mixed numbers and changing draft gears will not get them right.

The way to keep even numbers is to start with an even lap, and keep every machine in good fix, clean and well oiled, and the numbers will stay even, (not mix up). If they vary they will all vary the same way, not some get too light and some too heavy and some be the right weight, but will all vary to the same side, if caused from a change in the weather or a change in cotton.

If you will weigh your speeder roving once per day, and your card

sliver and finished drawing twice per day, and you find your numbers one-half grain off the standard, change your lap standard accordingly, and you will never have to change the draft on the speeders or spinning, except when you are changing from one number of hank roving to another, or from one number of yarn to another. My ideas are to watch the numbers closely and change the lap standard when the numbers vary heavy or light, which they will if you haven't a good system of humidifying, and heating, so as to keep the same degree of heat and humidity all the time.

If your numbers are giving trouble try some or all these rules and you will find that they will get better results than all the changing draft gears, or blaming the cotton.

## Number Seven.

By T. J. DIGBY, Newberry, S. C.

We don't know that we could justly go back to the planting of the cotton to take up the subject of "Uneven Yarn." However, we do believe that there should be more consideration given to the selection of the cotton seed for planting in order to get a better and more even

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running staple, all of which tends toward a more even uniform yarn. Also if your staple was even running your numbers would be easily kept—hence a more even yarn.

If cotton is not properly ginned (we mean by this, saws in bad shape, too dull, and not set right) it will injure the staple, cause bad spinning and uneven yarn.

It would be better for manufacturers if it were possible for all cotton to go through a conditioning process preparatory to ginning. It is the opinion of the writer that the staple does not reach its full maturity until it has stayed on the seed a certain length of time after the boll has opened, therefore, it should be ginned after being housed about thirty days, especially the first picking. Then as before stated, great care should be exercised in the ginning; saws should be sharp and properly set so as not to injure the staple.

When taken to the opening room great care should be given to the mixing, especially if you have more than one grade of cotton to run. You should see that the exact number of bales of each grade is put into the mixing. If you are not equipped with bale breakers, or some other up-to-date machinery for opening the cotton, such as the C. O. B. machine, it would be well to open up as much cotton in your opening room as you can, even if it is two or three days run, and give your cotton a chance to open up to its natural state, which will help considerably in its spinning quality. This is more imperative in dealing with compressed cotton.

If possible you should have your breaker lappers equipped with eveners, and all aprons equipped with chain drives. The eveners on your breakers, intermediates, and finishing pickers should be kept in the best of working order at all times so as to take care of the slightest unevenness in the laps. You should keep picking machinery well cleaned and in good repair, and see that all laps that are under or over the standard allowance are thrown back and worked over, all of which will tend to more even yarn.

Next we will take the cards. You should see that your cards are ground and set up exactly right for the grade of work you are on, as irregular settings on your cards, such as feed plate to licker-in or licker-in to cylinder, as well as other settings will cause the sliver to vary in weight on the different cards, which, of course, would cause uneven work. Also the way the card hands laps his cards, letting some run out and putting others in double (also split laps) will cause uneven work. And if you don't keep a close watch on your men who strip cards they will make a lot of uneven work by starting the cards too soon after stripping and letting slivers run into the can before attaining the proper weight. It is impossible for the draw frames to take care of all these evils, as you generally have to run your drawing with cheap hands who are careless, and don't care a ran just so they keep the cans empty. They don't care whether the frames stop when the cans run empty, or the sliver breaks, or not, and at this point is where a great deal of the uneven work is made. Frames not stopping off when sliver breaks, rolls dirty and choked up, flutes full of dirt, and frames not properly cleaned and oiled, all play a part in producing bad, uneven work.

Next in order comes the slubber, which makes its pro rata share of the uneven work, caused mostly by careless operation by the slubber hand in changing cans and piecing up behind. Great care should be taken not to run doublings, as an inch of doubling on slubber means many yards of doubling when it has passed through the spinning frame. The slubber should be kept clean and all parts well oiled; especially the rollers should have special attention as to cleaning and oiling. Also the tension at this point should have good attention to see that roving is not stretched and the proper amount of twist put in so that when it goes to the intermediates it will not stretch in the creels and cause uneven work there. You should also see that your skewers on intermediates are in good shape so that the pull in creel will not be sufficient to stretch the roving. Intermediates should be well cleaned and oiled, especially steel and top rollers, and see that you have no worn out or defective rollers. And of course the steel rollers should be set to the length of staple you are running; the shorter the staple the closer the rolls should be set, and the longer the more open. Lots of uneven yarn is caused here by bad creeling. A few inches of doubling on intermediates would mean a great many yards after passing through speeders and spinning frames. The same care should be given to speeders as to intermediates, such as keeping a close watch on the creeling to see that the creeler hand breaks off the old roving when the new one starts in. See that the rollers are kept clean and set the proper distance apart for the staple you are running. See that the shells are taken off each week, arbors well cleaned and oiled before putting them back in frame. All this has to do with even yarn.

You should not run your roving with a too soft twist or it will stretch and break-back in creels in spinning frames, causing spinning to run bad. thereby making uneven yarn. Also too much twist in the roving will make an uneven yarn.

On spinning frames you should see that you have no blunt skewers, keep your rollers well cleaned and oiled, get all choakes off your steel rollers, and see that your top front rollers are same size on both ends. Your rolls should be calipered on spinning, also on all the fly frames, and matched up to avoid making uneven yarn. You should also see that all weight levers are set level on spinning frame with weight hooks in same notch on all levers. Frames should be well aligned and leveled, and spindles should be plumbed at top and bottom, all of which will help to make good even yarn.

We would also say before closing our article on uneven yarns that great care should be given to the piecing up of the ends on the slubbers, intermediates, and fine frames so as not to make hard ends or doublings, which, of course, would cause uneven yarn. Many times when ends break down on the fly frames, th sliver or broken end catches up to the end running on the right or left of this broken end, which, of course, causes a doubling. The hand piecing up these ends should be compelled to pull off these doublings, or be fined

for their carelessness, as a few yards of this doubling on slubbers or intermediates will mean several hundreds of yards of doubling when same has passed through the spinning frame. The same applies to speeders. Also hard ends made by bad piecing up on the fly frames give trouble all the way through and injure a large per cent of the leather covered rolls. When said hard ends have passed through any of the machines that are equipped with leather covered top rolls they will tend to groove these rolls more or less, after which they will not draw perfectly until replaced with new ones. This is another cause for uneven yarn.

Last, but not the least, by any means, is poor management in the spinning room. Spinners should be taught to piece up ends at all times without making lumps and gouts and where ends break down without catching on the scavenger roll, but catches to the end running on the right or left. Spinners should see that this yarn is pulled off the bobbin and not allowed to go to the spooler room. Overhead cleaners and sweepers should be taught to be careful to avoid letting loose lint and waste catch to the ends on the spinning frames. This also applies to card room, which is another reason for uneven yarn.

## Number Eight.

By W. V. JONES, Social Circle, Ga.

As you are running a contest on "Cause and Prevention of Uneven Yarn," I will proceed to air my experience on same. As the average cotton buyer for all mills buys cotton from various climates and localities, the average mill has a variety of cotton staple to begin with, consequently it is necessary to blend this variety of cotton into an even and regular mixing each day, or mixing time.

The mill I am working for has about 2,500 bales of cotton on hand, grades A, B. C. D, as we call our mixing code. D is the best staple, averaging about 1 3-16 inches, A averages 1 1-16, B averages 1 1-8, and C is slightly above 1 1-8 and a little under 1 3-16. As I cannot open but 10 bales at a time. owing to lack of space, I mix 3 bales of Ds, 2 Cs, 4 Bs, and 1 As. I never allow this mixing to be changed, and using a blow system, I open cotton today for tomorrow's run. I am making 20s warp, 24.50 filling. What little waste the room makes is run through the intermediate picker each day, with 50 per cent good stock, taken from the back of the cotton pile and thereby mixed in before starting to use, so I avoid the uneven weights caused by too much waste at one mix and not enough at the next, to keep on an average basis.

The object of the picker room being to clean and condense the stock, it is only accomplished when the machinery is kept in good working order and properly adjusted to suit the staple. If you are using 7-8 inch staple and setting the picker machinery for 1 or 1 1-16 inch staple, the result is a lot of varying flyers of good stock and uneven laps. I am making a 50-pound finished lap, allowing one-half pound for variation, one-quarter each way and keep standard weights on breakers and intermediate pickers, and paying special attention to the workings of all eveners. I am producing even finisher laps, which are uniform through the entire length and not merely getting 50 pounds case. Laps weights may be O. K., and yet not produce even work. In such cases, look after your air circulation and beater speeds. When a good even lap is placed on the cards, properly set, the result is an even, well-carded sliver.

See that all flats produce the same weight strips. Weigh motes and flyers from each card occasionally to ascertain whether they are all producing equal amounts. Examine all draft gears and bevel gears on side of shaft at doffer end to be sure that none are slipping, and causing light work. Test the cylinder speed and get all running the same as a high speed cylinder throws off more flyers than one running slower. Gauge up the sliver trumpets, get them all to suit the diameter of the sliver, then see that all of them are the same, as a small trumpet hole will make lighter work, and a large hole makes heavy work. If the holes are not uniform

the result is uneven work. Do not allow sliver to run in card while stripping or immediately after. Wait for the cylinder to get stocked and avoid light places. Do not allow cans to run too full and stretch the sliver. Doff the cans by a schedule and you will prepare good even stock for the drawing.

When placing sliver on drawing do not allow it to run tight or crossed from the cans. Have a place for every end and every end in place; space the rolls to suit staple length. Get exact distance from bite to bite by placing a small copperwire (extracted from some old electric wire) between top and bottom metallic rolls while frames are standing. This gives you a good impression to measure each frame by and see that they are all alike. And if they are set to suit the staple in process, you will not find blotchy or cloudy sliver at the front rolls. Keep the drawing rolls and gears cleaned, oiled and working fine, for if the rolls or gears run dry, you will find the results is heavy and lumpy sliver. Have the can tables plumb, so every head will produce alike. If a 6 delivery frame produces 1 can, with a hole 1 1-2 inches in diameter, in center of coils, number two can has 1 1-4 inch hole and so on, diminishing down to 1 inch hole in can number 6, all this is sure sign that your can tables are not plumb. Have a space of ¾ inches between can top and coiler plate gear. See that all are the same. Try a can of overpacked sliver at slubs and one not run full, and if you have less than 2 or 3 grains difference in 12 yards, I'll set 'em up.

On slubbers pay special attention to the rolls, their condition, spacing and oiling. If you have shell rolls, have calipered pairs; use good heavy oil for same. See that the lay is not piling up, keep tension right, and do not allow tenders to take up or let off tension by hand. You have a piece of mechanism for that purpose. Get after it and put it to work. Do not allow the help to unwrap some and not all of the presser fingers on any frames. Do not allow twist draft lay or tension gears changed on a part of the frames without making all frames alike. If you do, you will have uneven work made. Place in the spinning a good even roving that will not stretch simply by being unwound.

We will assume that we have placed in the spinning a perfect roving. It is to be feared that spinners have not perceived clearly the perils which tend to beset the roving and produce poor and uneven yarn in weight which is sometimes the from perfect roving. Do not allow spinning skewers to run that have nails or wire in them, or one that has been whittled down on the bearing end, as it is of a special shape, which once destroyed, is rarely restored. When they are damaged or broken, discard them and avoid that strain on the roving. Have all weight levers set to a gauge so they will all hang about level and not rest or vibrate against the boards. Keep the top leather rolls in good condition. By condition I mean just what the word implies, reasonable cushion, good laps, well covered, cleaned and oiled. Test out the spacing of bottom and top rolls as above mentioned with small wire. Be sure to space to suit staple and avoid brake draft and unnecessary flyings of short fiber, which often occur when changing from one number traveler to another on frames. Sometimes help fails to collect supply of old travelers in cups and eventually they become all mixed up. This produces uneven yarn from good roving.

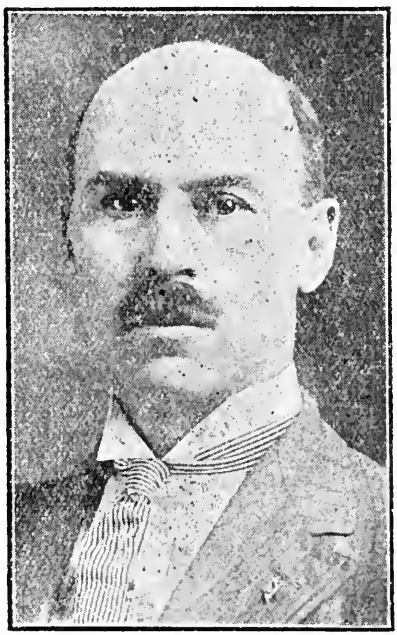
Have all the bands uniform in weight and tension, keep spindles oiled regularly, and all bolsters properly adjusted. Give every spindle the same treatment and attention, as though it was the entire room. Do not allow frames of the same counts to run different drafts, twist or speeds, as this will make uneven yarn. Keep the clearers covered and do not allow them to bind on roller bars, causing hard twisted and heavy yarns. The question of oiling and cleaning rolls is important to even work, and one also that local conditions govern. To answer this, repeat the action so often that they cannot get dry or run dirty. A few "dont's." Don't allow the roving cut, don't allow a solid roll which has been run in front to be put in the back or middle, don't allow spindles to get out of plumb and create unnecessary strain on the yarn, don't allow roving to run crossed in creels, don't allow roving guides to choke up or stand still, don't allow roving to run

off with the reverse end up, as this pulls out the fibres and makes light yarn, don't allow any bad creel steps, don't allow shell rolls on spinning without having them calipered in pairs, as a large roll and a small roll on the same arbor make different number yarn. Above all, don't allow a section man in your room who will not look after the little things and remedy them. You can see a shaft fall down or a spinning frame on fire, at a distance. Pay attention to bands, oil and traverse at spoolers. Do not place excess strain on yarn and break it with tension and excess speeds at spoolers and warpers, as a single 20s yarn, 35,000 yards long, has been known to contain 15 grains of knots.

## Number Nine.

By CHAS. M. STOY, Anniston, Ala.

In order to make even yarn, the cotton should be of uniform grade and staple, and free from dampness. To bring about this condition as near as possible there should be two mixing bins large enough to



**C. M. Stoy**
Anniston, Ala.

hold two days mixing with the cotton from each bale well shaken up and evenly laid over floor, one layer on another, until a day's run is put into each bin. While one bin is being used from the other bin can be filled.

The opener hand should take armfuls of cotton from top to bottom of pile when filling feeder, so that some from each bale will be fed into hopper. The hopper should never be allowed to get below 3-4 full. Cleaning trunks should be kept free from chokes so that the cotton will be sucked onto the screen in a smooth, even sheet. All air currents should be evenly regulated. The fan speed should not be too high for split laps will result; 900 revolutions per minute is fast enough to run them ordinarily. When there is not proper mixing space, mix as large a quantity as it is possible to mix in the manner above described.

All waste from card and spinning rooms should be mixed with about 50 per cent of cotton and run into separate laps one of these laps put onto the intermediate apron with three laps of cotton. Three blade beaters should only run 950 revolutions per minute while 1,540 is a good speed for two blade beaters. Beaters should be kept fairly sharp and not set too close, as broken staple and split laps will be made. Eveners should receive close attention and set so as to give best results according to the quality of the cotton and weight of lap going into the machine. Each lap taken from finisher should be weighed and all laps over or under standard should be put back on apron and re-run.

### Cards.

Cards should be true and sharp, set to No. 7 to No. 12 gauge from feed plate, according to weight of lap. A dull or mashed lickerin will jerk the lap in in bunches. No air currents should be allowed under cards. No waste allowed to accumulate and roll up in lumps at end of cylinder or doffer, thus causing an uneven selvage in web. All waste taken from under cards as often as it should be. Cards should be stripped as often as the quality of the work requires. In stripping it is best to strip every other card and when around start back and

strip those that were not stripped the first round. Always start card up and let end run onto floor until the next card is stripped, thus allowing card to fill up. When putting on laps pull off 12 to 18 inches of the old lap as it is always heavy. Make short splices so as not to double in the lap. Have all cards set to take out 2 1-2 to 3 per cent waste. All single and double should be pulled out of can and end properly spliced.

**Drawing.**

This is the vital point in the process of manufacturing. Therefore constant care and close attention should be given it. Metallic rolls should be carded twice each day, top and bottom, by the drawing tender and given a thorough cleaning and inspection of gears once each month by the section hands and grinder. All rolls and gears oiled regularly each day. Top rolls thoroughly wiped with waste to remove dirt and chokes. The back should be all creeled at one time. A careless hand some times puts an extra end in behind in order to catch up. This should never be allowed. If leather top rolls are used they should be given close attention and regularly varnished and oiled. All bad rolls, should be taken out of frames as soon as discovered. All gears should be gone over regularly, oiled, examined and set. All single and double must be pulled out and splicing properly made with a short lap.

Work should be weighed three to six times a day according to numbers, and gears changed to suit variation of weight of sliver, as this (outside of the picker room) is the place to keep numbers. All top rolls evenly weighted. Heaviest weight on back rolls, next heaviest on second, and so on, with the lightest weight on front. Draft should not exceed six (6). Stop motions must receive close attention and set to stop as soon as an end runs out or comes down in front. Spoons must be well balanced, kept free from lint in order to act quickly. The sliver should be closely examined from time to time and rolls kept properly set as the setting of draw frame rolls, how and when, is of great importance. The sliver guide at back roll should be adjusted so the sliver will come out in front an even sheet.

There should be only enough draft between the front and calender roll to prevent sagging of the sliver, and not enough to stretch it. The point of the trumpet should be as near the bite of the calendar roll as it is possible to get it without it rubbing the roll. Sliver should only be condensed enough to make it pull up to the back roll of the next machine without stretching, as too much condensation prevents an even draft.

The sliver on draw frames and slubbers should be tested every few days by inserting a gauge between the back and second rolls and feeling the strength of the cotton by pushing down on it. This will determine whether the back rolls need opening or closing, If it needs opening the stock will be found to stand very hard pressure and if needs closing the stock will feel weak. There has been many a good man to lose his job just because he did not know how or when his rolls needed setting. Three of the great essential points to consider in making good even yarn are proper speed on all machines; second, good common sense and systematic methods and application in handling the cotton in its various processes, and third, close attention and care to the condensation of the sliver and the setting of the rolls on drawing, roving and spinning frames.

**Roving Frames.**

These include slubbers, intermediates and speeders and on very fine numbers jack frames. These frames should be leveled and overhauled and spindles plumbed once each year. Steel rolls should be scoured every six months. Drafts should be 3 1-2 to 4 on slubbers, 4 1-2 to 5 on intermediates and 6 to 6 1-2 on speeders and jack frames. All chokes should be kept out of trumpets. Skewers should be well pointed and roving steps kept in creel. All broken ones replaced with new ones. Flyers balanced and free from chokes. Sockets on flyers and tops of spindles clean and occasionally oiled. Bobbin gears and spindles oiled each day, steps oiled every two weeks. Bobbin and spindle gear set so there will be no jumping of spindles or bobbins. Creel rods clean and smooth so that roving will not strain.

**Tension.**

The proper gear to give an even tension to ends so that the frame

hand will not have to alter the tension in the run of a doff. Endless cone belts, proper gear on end of cone to give the proper starting speed for bobbins. All bobbins gauged. Bobbins with wornout bottoms discarded. Top rolls well oiled and kept clean. Shell rolls well oiled once each week, and paired to match. Rolls spotted so they can be put in so laps will run the right way. Poorly covered, top rolls fluted, and all bad rolls taken out of frame.

**Steel Rolls.**

They should be kept free from laps. Regularly oiled and stands wiped, flutes scoured with card clothing two to three times a year. All crooked joints renecked and made to run true. The gears should be set so as not to bind or make the roll tremble as uneven work will result. The rolls should be set to produce an even strand. One has to be governed by the twist of the roving, the weight of stock, the speed of the roll, and the length of the staple.

**Twist and Lay.**

There should only be enough twist in the work to pull itself into the back rolls without stretching. The roving traverse must be kept running and traverse as near across the face of the rolls as it is possible for it to do. Clearers should be picked regularly. Frame hands should not be allowed to stick cotton under clearer cloth. The carriage should be oiled regularly so that it will not jump. The proper lifting gear run even. Pressers should all be wrapped alike. The wrapping of pressers should be governed by the length of staple used. All doubling and single should be pulled from bobbins, short splicings made. Speeder hands should not be allowed to fan frames, but wipe off flyers and roller beam at regular intervals.

**Spinning.**

The same general rule applies to rolls, draft, creels, etc., as in the card room. Spindles should be oiled regularly and plumbed to run true. Travelers should be the right weight and have the proper circle for the ring. Guide wire set over center of spindles, roving traverses kept in working order, lifting rods clean and free of chokes, rings properly set and set down level in ring rails. Ring rails should be leveled and clean. Spinners should not be allowed to make bad piecing, doffers should set bobbins down well on spindles. All choked bobbins punched out. All slack bands cut off of frames, and all bands tied on with care and judgment. Bands made from hard twisted roving, creels kept clean. All weight levers kept free from back board and leveled. Use proper weights to suit the work being spun. All steel rolls should be kept cleaned and regularly oiled. Under clearers well covered and made to turn and not fall out of frame. Clearer boards kept in good condition and cleaned at regular intervals. Spooler guides set so as not to chafe the yarn. Knots should be tied with a knot tier. Warper hands should not be allowed to fan lint on the yarn as it will make lumps and bunches. Running spools too low on warper creels. Yarn slashed on slashers without side shafts, etc. There are many other things that will cause uneven yarn, but space will not permit me to tell.

## Number Ten.

By E. B. WISE, Batesburg, S. C .

First, let us consider the different soils on which cotton is grown. That grown on sandy land does not produce as even yarn or as clean work as cotton grown on clay or stiff land and (that of the clay or stiff land) the latter has the strongest staple. The more frequently cotton is cultivated the better yarn it will produce. The first picking will not make as even numbers as the second picking.

Next the cotton buyer for the mill should be a good judge of what is required.

Most of them have small mixing rooms and can only get a day or so run at a time and if there is, say 12 or 15 bales of blue, fluffy, ordinary, grade sent down on Monday, then on Tuesday the buyer sends 12 or 15 bales of good middling. Then the numbers are sure to go to pieces, while if all these were put together and thoroughly mixed it

would be all to the good with the numbers.

The opening space should always be large, where, say 50 to 100 bales mixed at once, even for a 20,000 spindle mill then our numbers would go even. The opening room should be kept closed during damp nights, as cotton is a great absorbent. Next to the breaker picker, if the hoppers are not kept uniformly full the breaker laps are off and the less the intermediate and finisher belts have to shift on account of heavy and light breaker laps and intermediate laps, the more even yarn you get.

Next we go to intermediate pickers. First have all evener parts in good repair, also keep clean and oiled well. Do not allow 4 full breaker laps on apron at one time, but use 2 half full and two fulls. Try one each way and note what the difference is on your intermediate laps. Keep cone belts in center of cones, or your evener can't make even laps, do not allow picker men on any machine to lap the laps when putting on full laps. This is a practice causing much uneven yarn in a great many mills. I have seen men let 3 laps run on intermediates and finisher pickers for a day or so because the breaker laps were heavy and they were too lazy to change the draft gear, still they want good even yarn. Now, the finisher should be watched more carefully than any machine the carder has, if he wants to give the mill good, even work for what faults leave the picker room, such as heavy and light places, cannot be entirely remedied elsewhere. The evener must be in perfect condition and laps all weighing not over 1-4 pound allowed to pass. Weigh after the finisher man and have him put the weights down. I have had them to quit on account of weighing right after them, but better them than me to be hiked for uneven work.

The aprons should be kept tight, so as to not slip, or better still, use a sprocket chain and sprockets on the apron pulley shafts. A carder should also see that his air adjustments are right and in damp weather adjust so the laps won't split which can be done, most especially if you use a split lap preventer which will stop most of it. Then if your laps split, put more cotton on top cage than you do on bottom, or you may have to cut nearly all air off at times. This is very important and I will say right here, most of unevenness is caused by picker room being neglected. The cone belts and shifters should be watched closely as the belts will get slack and not pull and make uneven numbers. The shifter rods should be oiled and kept clean. The picker room should be kept closed at night and in damp weather, as the moisture will cause the first laps to be heavy and when they get through to spinning the yarn will show up light.

Now, as to cards, I have seen card hands lapping cards and lap the ends of the laps 4 or 5 inches. This makes a thick, heavy place all through the mill. Again they will allow lap to run out causing light sliver and never take it from can, there is a light streak all through to the yarn. Sometimes a card is allowed to run with the sliver dragging or sagging on floor, caused from worn shafts in coiler head coiler rolls. This can't make even yarn. Card flats should be kept sharp and and set to suit the production and stock. Be sure there are no faced flats as this will cause the sliver to draw badly, and you will have uneven yarn. Many a man has wondered why his yarn was uneven when it was caused from dull flats and a sliver that couldn't be drawn even.

Now, go to draw frames. I know of mills which used metallic rolls on drawing and on top roll weight on front rolls. The weights varied from 2 pounds to 10 pounds. When an end would run slack they would take weights off until it ran right, or prick punch the shoulder of bottom roll, either of which is sure to give uneven yarn. The spoon and knock-off motion get bent or dirty or the spoon holders dull and I have seen ends run for 15 to 20 minutes with just 5 doubling where there should be 6. Have your spoons examined twice a week and your drawing creeled a set at a time. The ends should be spliced and not thrown in. The latter will give 7 ends for 5 feet and it should be 6. Of course this can't make anything but uneven yarn. Some times the draw frame tender will prop the knock-off motion with a piece of cotton and I have seen as few as 4 ends running where there should be 6. You see this is 33 1-3 per cent light, and with the other doublings you can't get it less than 15 per cent

light side. Watch tension on drawing and see that ends do not run too tight or slack; also change rolls where you have an end. Just one or two on a frame that are tight or slacker than the balance you can find a roll on some other frame that will fix the ends or end all O. K., and have good even sliver so far. See that trumpets on cards and draw frames are the right size, not to compress the sliver too much, also not to make fluffy and soft sliver. This is sure to give uneven work. I have seen draw frames where the holes in some trumpets were three times as large as the others and consequently uneven work.

Next, go to the slubber. Have shell rolls oiled every two weeks, solid roll oiled once a day, just a drop. Have bottom and top rolls cleaned once a day. See that pressers on flyers are in good shope, spindles are kept oiled well, also that there is no jumping bobbin gears or loose spindle steps and that flyers are firmly seated on spindle. See also that the ends are all wrapped the same number of times around the presser finger. Have frames kept clean, oil steps once a month. Have tender to piece drawing when creeling and if a bobbin by an end breaking and allowing to run becomes too small, by no means allow him to run two ends into it until it becomes large again. I have seen this done in several large card rooms. Now, if above rules are carried out there is sure to be even slubber roving.

Now we go next to fly frames or intermediates. These should be kept oiled as the slubbers, and same rule as to rolls, flyers, pressers and drafts. I want to add that they should not be fanned, but wiped off. Fly frame tenders should also piece roving and not double it for even work, and they should not be allowed to tinker with tension. Have your section man to keep close watch on tension and by no means allow them to be run tight.

Now, just a word more and then we take up the spinning room. Keeping numbers should be done in a card room by the lap or on slubber. I prefer the lap, and in damp weather, raise your weight standard on lap from 1-2 to 2 per cent and you will have few changes on gears to keep even numbers. Also it is a good idea to raise the lap weight on inferior cotton to take care of extra loss.

Now, as to the spinning. I knew a mill where the numbers were irregular and the beams would pop up and down. They changed spinners 3 times in two years. The last one was one who took nobody's word about his gears, so found his draft gears to vary from 40 to 46 teeth on same numbers. Now, the other overseer had never known what they were running. They just told the section man what to put on and he put on what he found first. Now, this is the cause of a great deal of uneven yarn.

Sometimes the weight levers are not level, they should be set when one gets out of line. This will cause bad numbers; also some times a spinner will put a solid roll where a shell should be. I know a carder who said his weights were nice, but the cloth couldn't be kept right. A new spinner came and found 360 solid rolls in a 12,000-spindle mill, where there should have been shells. A fluted roll should not be allowed to run, as it will cause a variation.

Now a few don'ts and I've finished.

Don't fail to inspect your pickers several times a day.

Don't allow oil to run in beater cages.

Don't allow card tenders to let singling to go through, have draw frame hands hold back singling and report it.

Don't allow laps punched out at ends.

Don't run front draw frame rolls faster than 300 R. P. M.

Don't miss a week cleaning fluted rolls on draw frames.

Don't miss a year going over fly frames, draw frames and slubbers—overhaul them.

Don't allow frame hands to hold a roll to make an end run tight or stuff cotton under clearer clothes to put more pressure on front roll.

All of the above "don'ts," if allowed, will cause uneven yarn.

## Number Eleven.

By A. B. BROWN, Belmont, N. C.

I am glad to get an opporunity to contribute an article on this subject, The Cause and Prevention of Uneven Yarn. This is one of the worst problems the cotton manufacturers have to contend with today. I will try to explain to the best of my knowledge how to remedy and prevent the things that cause uneven yarn, but I would not try without first explaining to the young men who intend to make a success out of the cotton mill business the importance

**A. B. Brown**
Belmont, N. C.

of an efficient and thorough opening and mixing of the cotton. A thorough mixing is a firm foundation for this subject, but it alone cannot prevent uneven yarn. There are a hundred and one more things which will cause uneven yarn, but the opening and mixing, as I stated before, form a good foundation.

Mixing means the mixing of the different qualities of cotton in such a way as to secure an economical production of uniform quality and color, and at the same time an even yarn. Most of us know that to mix cotton thoroughly, we should have a bale breaker, and by using a bale breaker, cotton will not be thrown off of the bale in bunches and large flakes of from 12 to 20 pounds, and then expecting the automatic feeder to perform the work that another machine should have done. No matter how small your opening room may be, mix as many bales at one time as you can. If that is only 4 to 6 bales, see that they are thoroughly mixed, but if you can handle 40 to 60, then so much the better, as it will be the means of eliminating some of the unevenness of the yarn, though not all of it. However, the mixing and picker rooms have been too much neglected, but we are glad to note that they are now beginning to be recognized as the foundation of all even yarn.

The regularity of the laps is of the greatest importance in producing a perfectly even yarn. Close attention should be given to the feeding of the cotton to the breaker and to the correct weighing of the laps on all the picking machines. If your feeding is regular and your laps are correctly weighed, why it must produce even work on the cards, providing all other things are in good working order about the cards.

Keep the automatic feeder about half full all the time. It is necessary that all machines are kept cleaned and oiled all the time, and the axles at the beater free from rolls, else it will cause the cotton to run to one side and make heavy sided laps. Imperfect air currents will cause irregular and uneven laps to be made and this, as you know, will cause uneven work throughout the mill. Keep the evener belts in good working order. Never run an evener belt that is hard or stiff, or one that is put together with a buckle or lace, but use good, soft, pliable belts that are cemented together. Keep all gears well set and in good working order. (Anything said about gears or belts on these machines will apply to all other machines throughout the mill).

We next take up the cards. Carding is the most important process of the entire system of cotton manufacture and is the life of good spinning, and of perfect yarn. The theory that imperfect picking and carding will regulate itself at the

drawing and other processes should be exploded. The sooner we realize the importance of good mixing, picking and carding of cotton, the sooner will our manufacturers come up with those of New England.

Uneven yarn can be caused at many points in the carding, and from now on through this article, I will give just the point and give it just as clearly as possible. As the space is limited and I do not wish to use too much space, I will say that uneven yarn can be caused on the cards as follows: Improper setting, lickerin-in in bad condition; card clothing in poor condition and improperly ground; too much draft; work too heavy; machines not oiled and cleaned as they should be; stripping not well done; clothing not suited for the numbers being spun as you cannot spin yarn with any success where clothing is made for counts 30s and you try to spin 60s; bad piecing at back and front of card when putting up laps at back and putting up ends at front, as this causes heavy and light places in the yarn; putting up ends at stripping time before the cylinder is allowed to fill up and fanning off cards with a broom or burlap will cause thick places in the sliver where the lint flies into it. All of these things should be watched closely and guarded against.

Next we come to the drawing frames. Poor conditions of the rolls ,whether solid or shell, or rolls not being same diameter, should be avoided. Uneven work will be caused by poorly varnished rolls, or if metallic rolls, not being properly cleaned; rolls not correctly weighted and oiled; top and bottom clearers not kept cleaned; change gears not properly set and gearing not all in good condition, and worst of all, some of them slipping; rolls not well set, too much draft between back and third to calender rolls; bent rolls; flutes worn out; stop motions not working as they should; poor piecing, both at back and front; worn necks on roll; bent rolls; stop motion not working properly; calender rolls not properly set; trumpet too large for weight of sliver being run, and sliver not as well condensed as it should be, sometimes seven slivers being run through instead of six, the tender doing this on the sly so as to keep up more easlily; frames not being kept well oiled, and last but worst, the electric stop motions not working properly.

We now take up the slubbers, intermediates, speeders and jack frames, all as one, as they are all on about the same principle.

Some of the things to be avoided are, poor piecing at the slubber and roving frames; long piecing when creeling hard ends; (when creeling just enough lap should be made to hold it together, not twisted too hard as this will make light and heavy places in the roving) gathering of waste at the top and bottom of skewers; skewers binding in creels and in bad condition, in most cases caused from broken creel steps; top and bottom clearers not kept clean, poorly covered rolls, and rolls not fitting well; rolls not kept well cleaned and oiled and adjusted; steel rolls not clean; flutes worn out; rolls put in with laps running wrong way; loose fitting joints; worn necks on rolls; bent rolls; too much draft between back and middle rolls; too much draft through the whole machine; tension too tight. Never allow the frame hand to take up on tension, but instead change tension gears. Other causes for bad work are flyer pressers not weighting of rolls on either spin-wrapped correctly; improper winding of the roving being made a radical change is being made by not changing bottom cone gear and builder gear; change gear not properly set; spindle and bobbin gears set too deep; ill balanced and poor fitting bobbins; flyers not kept cleaned and balanced; the whole machine not kept well oiled and cleaned; fanning off machines with broom or burlap, flaps as they are called; roving guides becoming partially filled with waste; running top rolls with grooves in them.

Spinning uneven yarn is to my mind the greatest evil which the mill man has to deal with and if the work goes to the spinning room in good condition, it can also be ruined there, as the overseer has important things to look after and watch very closely or else the yarn will be ruined. I will now try to explain the important points to be looked after in the spinning room. Bad yarn is made when lint is allowed to gather on top of the creels; waste allowed to gather around top and bottom of skewers; skewers in bad condition, broken creel steps; long pieces when setting in full rov-

ing; skewer eyes and skewers set down into creel boards, creating more strain on the roving; roving guide rods not properly set, so as to travel the proper length; roving guides partly filled with waste and in bad condition; loose rings; slack bands; allowing spinners to fan off sides; travelers too light; worn out steel rolls not kept cleaned; lint allowed to gather around separators; spindles out of plumb; guide wires worn out or not properly set; scavenger rolls not covered, which will cause steel rolls to lick up ends and make a different diameter; saddles not correctly placed on rolls; stirrups rubbing steel rolls (this applies to fly frames also). What has been said in regard to rolls, saddles, stirrups, or weighting of rolls on either spinning or fly frames will also apply to the others.

I think that if these points are looked after closely, there will be little danger of uneven yarn. Of course there are several other things that could be mentioned on this subject, but as I said in the beginning, the space is limited, and I think I have about covered the space allowed. I will close by adding that if you carry out the mixing and picking as I have tried to explain and then watch for the other defects that I have pointed out, you will obtain an even yarn.

## Number Twelve.

By J. W. OUZTS, Eufaula, Ala.

I will give a brief outline of causes of uneven yarn and some of their remedies. We will assume that the proper stock for the yarn being spun has been provided, and begin at the mixing. This should be from as large a number of bales as space will permit, and at least 24 hours old before using.

Waste should be mixed in with the pile or thrown into the feeder at intervals by the tenders, but a separate hopper should be provided to feed the waste in steadily, just heavy enough to take care of the amount of waste used. A hopper can be built by any ordinary machinist and carpenter at small cost, or purchased from the shops for a trifle. And it is well worth the price.

Cotton should be torn up finely before throwing into the hopper, so that the feed at the breaker lapper will be reasonably uniform. The breaker lapper must be kept clean inside, cage section in good repair, lap draw heads even and of proper resistance. The fan speed should be just strong enough to keep good cotton from going into motes. Set beater 3/16 inch from feed rolls. The above applies also to the intermediate and finisher lapper. The eveners on these two machines require constant and careful attention. The moving parts should be kept moving perfectly freely and pulleys covered with white or red lead. To eliminate belt slippage, the belts should be very pliant and of a good clinging material.

It is very essential that the lap aprons on machines be kept in perfect repair. You can ill afford to use a poorly patched up apron. There should be a sprocket wheel connected to the gear on the end of the apron shaft and a sprocket wheel put on the end of the rear shaft, and a chain connecting them. This gives a positive drive rear shaft which aids in propelling the apron and lessens the liability of apron slippage. With the application of the lap splitting preventer behind the calender rolls and the attention outlined above, an even lap that will not split will be produced.

Of course it is necessary for the tender to be careful not to let the laps run out. In putting laps upon the apron, be careful to make an even splicing. Ends must not be lapped over and run in a lump.

A very accurate and sensitive lap weighing scale must be provided, and six weighings a day made on intermediate lapper in order to keep them to standard weight. Every lap coming from the finisher should be weighed and a record kept. Only a very slight variation should be allowed.

### Cards.

All card sliver must be weighed and comparisons made after each grinding and setting to see that slivers are of proper weight. Cards not stripping the same in flats or cylinder ,or both, or not making the same amount of fly waste, causes variation in slivers. Tenders must

be taught to splice in laps very evenly, and when part of the web at the doffer falls down and the other part runs into the can, this must be pulled out and a neat splicing of sliver made. Every time an end is put up, it must be spliced to prevent unnecessary stoppage of the drawing frames, for every time one of these machines is started, there is more or less damage done to the sliver. It is best to strip each alternate card in a line. Do not put the end up too quickly, but allow the sliver time to regain its normal weight, before going into the can.

It is absolutely impossible to make good smooth yarn from poorly carded stock. And to get good carding it is necessary to have a good, sharp, even-surfaced licker-in, sharp wires on flats, cylinder and doffer and close setting of the flats to cylinder. To keep the wire sharp, have a good sharp emery on the grinders, and grind reasonably heavy. The writer has been in mills where the emery was used until it had no more cutting qualities than measle bumps on a nigger's face, and the grinders set so lightly that they could scarcely be heard. A man might just as well be fanning at his cards with his old hat as to be grinding in this way, and good yarn cannot be made where this method of grinding is used.

Cards must be kept sufficiently clean to prevent batches of fly from collecting and blowing or dropping to the web. Of course all cards should have the same draft.

**Drawing.**

Here is where a lot of mischief is done. I am very partial to leather covered top rolls. As most men set their rolls too closely, I will not give any rules, as this varies with the nature and bulk of the stock being worked. Drafting rolls must be properly geared and all gears in good repair, and perfectly tight to prevent lost motion when starting the frame.

Defective trumpets are a fruitful cause of uneven work. The following will give an idea of the proper size for trumpets 45 grains sliver, 9-64; 55 grains, 10-64; 65 grains, 11-64. These should be bored with a straight drill and not reamed with a tapered reamer. as this tapered hole soon wears at the point and gives too much opening.

Breaker drawing runs better with five ends up and a draft of a little less than 5. This is true because of the curled and matted condition of the fibres, which makes it difficult to draw them evenly. So the shorter draft is more even. The second drawing is all right; 6 ends up and draft of six.

In operating drawing, all of the cans should be put in at the back of a whole frame at one time and nice, even splicings made. This eliminates the frequent starting and stopping which in itself is damaging, to say nothing of the singlings made from defective stop-motions, and doublings made when throwing ends up when stop-motion does work. All stop-motions should be tested once a week and corrected whenever found faulty.

When metallic rolls are used the front line of rolls should be replaced with new ones, both top and bottom, whenever one or more ends begin to sag down on one side, or run slack entirely. These rolls, when they begin to wear and collars get bumping, do a lot of damage, and play havoc with the breaking strength. Drawing frames should be provided with a full can knock-off motion, aside from the tube gear lift knock-off. When the can runs sufficiently full to lift the tube gear, the sliver stretches under the resistance.

Drawing should not be run at too high speed. A front roll speed of 370 turns is too much.

Drawing rolls must be kept clean, no lumps of any kind being allowed to collect in the flutes. Top rolls must be well lubricated, by no means ever allowed to be run dry.

Drawing frame tenders should all be well trained and taught the importance of doing their work properly.

**Roving.**

When replacing can at the back of the slubber, they should be spliced in when frame is knocked off to doff, and these splicings run through to where they will go in the first few rounds on the empty bobbin before slacking ends to doff. In this way these splicings are pulled off in the subsequent processes when creeling and do not go into the yarn. When creeling on intermediate and fine frames, the piecings must be made each end together, but they must not be made too thin. It is necessary for all top rolls to be good and smooth, well lubricated and free in motion.

Few people watch their flyers closely enough. The fingers on these must work properly and flyer be evenly balanced. Steps must be well oiled so that the spindles will run steadily. The roving must be wrapped the same on all fingers.

The tension on all roving frames must be well regulated and never tampered with by the tender. All roving frames must be kept clean. Drafts must not be too short on roving frames, nor too long; 4, 5 and 6 are good drafts.

**Spinning.**

You must have good straight spindles and good steps, and keep steps well oiled, so the spindles will run steadily. Rings must be replaced when worn. Travelers must suit the yarn and be changed before they are worn enough to cut the yarn. It is necessary to keep good easy running roving skewers, and skewer steps in good condition. All roving must have sufficient twist to prevent stretching between card and rolls. This applies to slubber and intermediate roving frames as well.

Spinners should be taught to piece up their ends without making a gout and not to make doublings when setting in roving. The frames and room should be kept clean. Warp yarn should be spun on filling wind traverse and a tension device similar to that used on a cone winder attached to spoolers. This gives an even tension on yarn at all times and prevents stretching the yarn in places.

I did not cover combed yarn in this article, but will say that in operating sliver lap and ribbon lap machines that what I said about rolls on drawing frames and prevention of singlings and doublings; and cleanliness, will apply to these.

As to the combers, the needles in the half laps must be in good order. Nippers must be set correctly for the length of the cotton being used, leather covered rolls smooth surfaced and carefully varnished. Stop-motions must be kept in good repair, laps watched carefully to prevent running in split and trumpets bored the proper size, all rolls well lubricated. All machines should be tested each day and see that the proper percentage of waste is being removed.

To make good yarn, and a good impression on the trade, it is necessary to have every machine in the mill well lined and level and running smoothly. No worn bearings, sprung shafts and wobbling pulleys should be allowed. The mill should be nicely painted inside and kept clean. The outside surroundings should present a neat appearance and living conditions for the body must be good in order to attract an intellectual class of help, which are more easily trained to do their work correctly.

## Number Thirteen.

By G. B. McCRACKAN, New Orleans, La.

The words "uneven yarns," are sometimes applied to two separate and distinct classes of yarns, namely: Such yarns as may be comparatively even so far as the individual threads are concerned, but vary greatly one thread from another. In other words yarns that are supposed to be No. 10s will vary from 9s to 11s or even from 8s to 12s. The other class of uneven yarns is yarns that may weigh comparatively even —one thread with another—and yet each thread may contain a large number of places that are much too thick or too thin; and as the cause and cure of these two troubles are different I will treat them separately and in the order named.

If laps are uneven in the picker room it will greatly affect the evenness of the yarn, and uneven laps may be from any or all of the following causes: Aprons slipping, causing light or thin places in the laps, pickers not properly cleaned, chokes getting wedged in the screens, leathers getting off of the casing that encloses the ends of the screens, evener motion not working properly, or some of the parts being badly worn. The evener belt should be set so that if one lap runs out on the apron it can move far enough towards the little—or fast end of the cone—to hold the feed up to the same weight. A fair way to set the evener belt is about 1-3 of the length of the cone from the large end. I have reference to the cone that drives the feed rolls.

Trying to run very damp and very dry cotton at the same time or trying to use compressed cotton

one day and uncompressed cotton the next day will have a very bad effect upon the evenness of the yarn.

Laps splitting at the cards,—dull cards, or improperly set cards will have a bad effect on the yarn.

Drawing frame stop motions not working properly allowing frames to run with one or more ends out at the back, will cause uneven yarn.

Some times drawing frame tenders will get behind with their work and in order to get caught up quickly will slip in an extra can, thus having one end too many up at the back. Again the help will some times pass card sliver around to the finisher drawing and as there is usually a difference in the weights of the cards and breaker

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drawing sliver it will cause uneven yarn. Too great a draft between front rolls and calender rolls will contribute to both classes of uneven yarns as referred to in the beginning of this article. A bad lickerin on the cards will sometimes so mess up the cotton that it will draw very unevenly at some of the subsequent processes. Sometimes the weights on the back rolls of a drawing frame will be allowed to rest partly on the frame and partly on the rolls. This will allow the second set of rolls to draw the cotton past the back rolls without drawing it out,. thus making the drawing too heavy. I have known careless operatives to take the weights off the back rolls altogether and let them stay off for days until it would become necessary for the overseer to make a systematic search to locate the trouble. Where leather rolls are used much bad and uneven work can be caused from bad rolls, or from improperly oiling or poor varnishing. I have obtained excellent results from varnishes made from receipes taken from the text books of the International Correspondence Schools, but I know of equally good results to have been obtained from other recipes. When metallic rolls are being used, especially after the rolls have been in use for a long time, the collars that prevent the rolls from meshing too deeply will become worn, and as they all do not wear in the same proportion, some of the rolls will mesh a little deeper than the others and thus cause uneven work. It sometimes happens that even old and worn metallic rolls can be matched up so as to get fairly even work, but it is very important that great care be used when scouring the rolls to get each roll back where it belongs, for if they get changed up, uneven work is almost sure to result. Much uneven work can result from the way the drawing frame tender gets up the ends at the back. I have seen drawing frame hands start a frame and throw the end up to the bite of the rolls and then drag it back two or three times in order to get it to go in straight and all the time the frame was running. This caused a place from 1 to 3 feet long to go through 1-6 light, and as there is usually a draft of 6 on the drawing, it made from 6 to 18 feet of light drawing and when this reaches the spinning it makes several hundred yards of light yarn. A good way to prevent this is to have the cans behind the drawing frames so arranged that the operative can walk right up to the frame and stick the sliver into the bite of the rolls. Another method that gives good results is to have the drawing frames creeled in the same way that a slubber is creeled—that is—start the frame with all full cans at the back and when one can runs out break out all the rest and splice the pieces together in one can and then splice in an entirely new set of cans.

Double and single roving on intermediates and fly frames will cause uneven yarns, but as the difference here is so great that most of it will

be detected on the spinning or spooling and thrown out, I will not discuss it further. However, it is a very hurtful practice to ignore single and double. If cotton is allowed to accumulate around the back steel rolls either on drawing frames, slubbers, fly frames or spinning frames, the increased size of the roll will cause them to take in more stock than they should, thus causing some of the ends to produce roving or yarn that is too heavy.

Where solid rolls are used in the front on spinning they should be very carefully watched and kept well oiled. The writer got into a good big hole once by not watching this. We were spinning No. 12s hosiery yarn and there was quite a lot of yarn being produced that looked more like 8s. The bobbins were no larger than the regular yarn that was right but had twist in it to make it appear like double roving. A careful investigation showed that it was due to lack of oil on the top front rolls. This will also apply to shell rolls but to a less extent.

I will now take up the discussion of the other class of uneven yarn or yarn that is cut or full of thick and thin places, etc.

Too much waste or short cotton in the mix will cause the roving or yarn to draw very unevenly. If the rolls on any of the drawing or fly frame processes are set too wide for the cotton being used, or if the rolls on the spinning frames are set too wide, uneven yarn will be the result. Too much draft at any of the above named processes will not only cause the yarn to be uneven but will make it very weak. Running tention too tight on fly frames will streach the roving and cause it to draw very uneven at the next process. It sometimes happens that bobbins are bought at different times from different firms and some of the bobbins are much larger in diameter than the others. When bobbins of two or more sizes are run on a fly frame at the same time some of the roving is sure to be stretched, and uneven yarn is the result.

If the rolls on any of the processes are set too close for the cotton being used the stock will cockle as it comes through and cause lumpy or uneven yarn. Loose joints and badly worn necks on the steel rolls are the cause of much lumpy or cut yarn, and I want to say right here that a fly frame roll may have a loose joint and yet make a roving that looks to be even, but when it gets to the next process the cut places will draw out and the roving or yarn will appear to be very lumpy. If chokes are allowed to accumulate around the joints of the back or middle rolls of a fly frame, or if they are allowed to run without grease or oil they will soon begin to run with a tremble, and the stock will appear cut or lumpy in the next process. If any of the readers of this article are troubled with lumpy roving, it would be to their advantage to go around and put their hands under their steel rolls and see if they are running with a tremble. This is especially true of frames that are very long and have draft gears only at one end, or if they have draft gears at both ends mesh and thus cause all of the strain to be on one set of draft gears. The torsion or tendency of the steel rolls to twist will allow them to run with a jerky or trembly motion unless they are perfectly free from chokes and well oiled. The cut places do not show until the roving is drawn out at the next process. Draft gears being set too deep, or a broken tooth, or gears not bored perfectly true all have a tendency to make the rolls jump, and cut or lumpy yarn is the result. Allowing under clearers to run without having cloth on them, or allowing a warped or bad one that will not turn to remain in the frames will allow the sliver from a broken end to catch in the threads and make some lumps; guide-boards getting too dirty will also cause trouble. Bad top rolls or shell rolls of different size on the same arbor, or weight hooks resting on the back boards will all cause lumpy yarn as well as to make the work run bad. If a steel roll is sprung or bent it will cause the yarn to be cut.

As to the cure for all classes of cut yarn I can only say: first locate the cause and then do all that can be done to remove that cause and the uneven yarn will either be greatly reduced or disappear altogether.

The above is only a small portion of what could be said on the subject of uneven yarns, but as I fear that I am using too much space I will bring my article to a close.

## Number Fourteen.

By A. C. ATKINSON, Clayton, N. C.

The contest on "Cause and Prevention of Uneven Yarn" should be a very interesting subject to the overseers and superintendents of the Southern cotton mills, for at the best we can do our yarn is very often uneven. At the end of this contest, however, I hope to be, and hope others will be, benefitted upon this subject.

Great care should be taken in selecting the stock to be opened; the staple should be as approx-

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imately uniform in length and strength as possible. It is absolutely necessary that the cotton should be well mixed, mixing as many bales as there is room to be opened, taking equal portions of the cotton from each bale and throwing it upon the pile. This cotton when being used, should be taken from the pile, perpendicular, as by this means a proportion of each layer will be removed together. Where the cotton is fed to the automatic breakers, the hopper should be kept about two-thirds full, for if it is run over to start with and then let run down real low before any more is put in there will be an uneven lap to start with.

The intermediate and finisher lappers have eveners and by keeping the eveners clean and active, we should get a good even lap. Have each finisher lap weighed as they are taken off the machine and do not allow these laps to vary over one-quarter of a pound either way, for laps must be made even, if even work in the following processes is expected.

With good, even laps upon the cards, then the quality of the work depends to a great extent upon good grinding and accurate setting as poor carding means poor spinning and poor weaving. The card hand, in putting on new laps, should not be allowed to lap the ends, but place them in just behind the end that is running out. If the ends are lapped this will cause a thick place in the sliver. Do not allow the cans to be run too full and tight, as this tends to stretch and weaken the sliver.

The drawing frames are perhaps the simplest machines used in the carding department and are among the most important. The drawing frame is for the purpose of drawing out and and laying in parallel order, the fibers. The drawing and doubling also greatly reduces the unevenness of the sliver. Very often when the carder has new help to work and they are not skilled enough to put on other machines he puts them on drawings. This is a great mistake. There should be a competent and painstaking person in charge. An improper working stop-motion will let an end run through, then if you haven't got a good man on the job he puts up the end, but fails to pull out the single drawing that has passed. It may not be many yards, but by the time it has reached the spinning room it has increased many times its length and results is weak and uneven yarn. A very important part of the drawing frame is the top rollers, whether metallic or leather covered rollers. Also the hooks and weights are very important parts. If metallic rollers are used they should be cleaned once per week and all dirt and foreign substance

removed from the flutes. If this is not done the flutes become full of dirt and the rollers will be slightly raised thereby causing cut sliver. When leather covered rollers are used they should be varnished regularly and often enough to keep them in good condition and with varnish that will not crack and peel off. When they are taken out to be varnished the section hand or the one in charge should examine each one to see if there are any with loose covering. If so they should be replaced with new ones, as they will damage the sliver. The rollers should be spaced to suit the stock, that is being used. This applies to the length of the staple.

Wornout trumpets are a defect on drawing frames and by all means keep the stop motion in the best of order, whether electric or mechanical. The sliver on the finisher drawing should not exceed sixty-two grains to the yard. In the slubbing process there is no doubling and is the first machine to put twist into the stock and wind it upon a bobbin.

**Intermediates, Fine and Jack Frames.**

In each machine there is a process of doubling. This adds to the evenness of the roving, if the frame is in good condition. Roving frame tenders should not be allowed to take up or let off the tension, for great care must be taken in regulating the tension upon the roving. If too great the roving will be stretched and thin and weak places will be the result. Top rollers on roving frames should always be kept clean and well oiled, if not they will run dry, thus causing cut and uneven work. All rollers should be examined once per month and all bad ones replaced with new ones. Steel rollers should be properly set to the length of staple being used. Roving frame tenders in creeling should not be allowed to lap their ends, but join the ends together, thus saving a thick place in the roving.

Frames should be properly geared up, loose, worn. broken tooth gears and loose steel roller joints will cause cut and uneven roving. Keep the steel rollers clean. Do not allow laps to accumulate on them, thus increasing the size and causing uneven work. The creels and roller beams should be wiped off and not fanned off, as the latter causes bunches to catch in with the work. Roving must not be laid too close on the bobbins as the layers will ride each other, stretching the roving, nor too far apart, but should be laid so as to give a smooth appearance.

Another defect on frames is the bobbin gears jumping here and there, which is caused by the gears being very dirty or not properly set. When bobbin gears are allowed to jump it causes the coils to over-ride each other as they are wound on the bobbins and when the bobbin is unwound at the next process the part of the coil that is receiving the pull may be under another coil, which in most cases causes the roving to be broken back. If not broken back it will be stretched, uneven work. The end being wound arounu the presser a different number of times, or allowing the eye and nollow leg of the flyer to become clogged with dirt. which will cause hard and soft bobbins. Frame tenders should not be allowed to make singling and doubling. Singling is caused when one end running two into one is broken and the single end is allowed to run for a few layers. When the end is pieced up the defective roving should be pulled off. Doubling is caused by the broken end in the above case joining with the two other ends running along side, making three ends running into one. Doubling is also caused by the broken ends in the front running in with other ends. There should be no excuse for making singling and doubling. If the speeder tender is making singling and doubling it is the overseers fault. When speeder tenders make bad roving they know it and they should stop the frame and pull the defective roving from the bobbin, otherwise it will go to the next process making thick and thin places.

With the best of roving delivered to the spinning room if not under good, watchful management uneven yarn will be made. Draft is a very important item. I do not think the draft should exceed (12) twelve on double roving and nine on single roving, 10.50 or 11 on double roving would be much better as long drafts make uneven yarn.

As I have said elsewhere the rollers must be properly set to the length of the staple, which is from 1-16 to 1-8 of an inch greater from

center to center of the rollers than the length of staple. If the rollers are too close together, the front roller will be biting the end of the staple before the middle roller turns it loose, thus causing cockley and uneven yarn.

Avoid changing draft gears on spinning as much as possible, because nine times out of ten you will make a thin place in each end. On the entire frame I find standard twist to be about the best, as too much tends to weaken the yarn and destroy the elasticity. On coarse yarns the travelers should be changed before they become worn enough to chafe and cut the yarn. On fine yarn they need not be changed as they will fly off when they become worn.

Use good top rollers and keep them clean and will oiled. Do not sacrifice the quality of your yarn by trying to save a few cents in the roller bill. Keep the weight levers in line. Do not have some of them resting on the creel board, this will not give a uniform weight on the top rollers, which will cause bad work. See that the roving traverse has a good stroke. Let it run as near the end as possible, without running out at the sides. It should not dwell upon the change. If the roving remains too long upon one spot it will wear a groove in the cot on the top roller and when the roving gets in the groove, the roller will not draw it as they should, thus causing lumps and bad places in the yarn. Have the roving wiped often enough to keep the creels clean and keep good skewers in the creels and do not allow them to be sharpened at the end with a knife, for this will soon cause trouble. The ends of the skewers will get brushlike, thus causing extra strain on the roving, making it break back and become stretched, thus making uneven yarn. Keep the scavenger rollers in good order and turning all the time, so as to catch the sliver as soon as the thread breaks. If the sliver is allowed to collect on the thread boards it will fall off and catch into the other ends, breaking more down, or cause lumps and gouts on the one next to it. Do not allow spinners to fan off or blow out their thread boards and back guides, as the lint will fly into the ends, causing lumps and gouts in the yarn.

## Number Fifteen.

By M. R. CHRYSTAL, Commerce, Ga.

### Openers and Pickers.

The picking department should have more intelligent care than it usually gets. Overseers should manage speed and feed to give plenty of time for cleaning both inside and out. Dirty and gummy conditions inside of pickers make very uneven laps. Beaters should be oiled light and often. All parts should be carefully adjusted and repairs looked after. Uneven and choked drafts cause much bad work. Evener motions should be closely looked after, cone belts should be kept clean and not too tight, use no grease on them. All calender rollers and piano motions should be taken apart and thoroughly cleaned at least every two months.

You should have a good sensitive scale, and every lap should be weighed and kept as uniform as possible. Beater blades should be kept properly sharp, and carefully adjusted to accepted guages. If pickers throw out too much clean cotton into the motes and fly, the grid bars should be set closer. When doing this fill the place under the beater with a narrow board covered with tin. Close all draft leaks and you will save much good lint cotton without injury to the yarn. These are good split lap preventers on the market and should be used as split laps are a great evil.

### Cards.

Cards should have very careful attention. All parts should be very carefully set to accepted gauges. Great care and skill is necessary for good results. Grind light and often. See that you have no slack fillets. Look closely after licker-in teeth. When the teeth are uneven and broken, have new clothing put on, although they do no carding, they should be kept sharp, smooth, and even, or they will not give good results.

Cards should be leveled and thoroughly gone over at least once a year, as a card out of level cannot be closely and properly set. I will not give any rules for setting as every skilled grinder has his own

rules, which in the main should be right. I have found this the best way. If grinder doesn't give good results, make him change his system or you change your grinders. Grinding emery should be kept free next two processes. I advise using the same system that I use on slubbers in drafting intermediates and speeders. I am using it now with good results. Don't use bobbin that are larger or smaller than the accepted sizes. Larger bobbins will stretch the roving, smaller ones will cause slack tension and soft roving. I can not emphasize too much the necessity of slack, uniform, tensions on all three fly frame processes.

**Spinning Frames.**

Spinning frames should be carefully leveled and lined about once a year, and all parts properly adjusted. Spindles should be plumbed top and bottom and thread guides set to spindles. Travelers should be carefully filled to ring flanges and changed fairly often. Rollers should not be set too close or cockled yarn may result. All bands should be of uniform sizes or uneven twist will result. Bad top rollers make bad yarn, dry rollers injure the yarn. Dirty rollers make much waste and dirty yarn, rough rollers make waste. Laps on steel rollers make uneven yarn, fluted leather rollers make uneven yarn. If used in front they make a finer thread than a good smooth roller. If used in the back they make a coarser thread. Top rollers should be carefully lined to steel rollers, or cut yarn many result. Roving guides should be carefully adjusted for the roving will run out at the ends and break or cut the yarn. Lost motion in guides ruin the rollers and badly cut yarn many result. Good, clean top roller cloths are a necessity. Cot wires should not bear on rollers. It cuts the cloth. In all mills where different sized whorls are used the spindles are liable to get mixed, causing uneven twist and kinky filling. Careful doffing prevents much bad work, every broken end causes waste and lumpy yarn. Frames should be very systematically cleaned and oiled. Eternal vigilance is the price of good quality and quantity. (All overseers and second hands please take notice).

**Keeping Numbers in the Carding Department.**

As my strong hold in the carding department has been keeping close numbers which is vitally important to even yarn, I will give my views on it. When my advice is asked about it I tell them that I keep them in the three processes of the picking department and this is true, as uneven laps are hard to overcome. Although I size my drawing twice each day, in doing this I measure one yard from every from oil, or dirt, for best results. Above all keep cards clean and free from all gumming substances, especially about fronts, as gum and dirt break many ends and cause uneven sliver. Don't fill cans too full. With light careful grinding cards need not be stripped more than twice a day as they will not change as much as heavier ground cards.

**Drawing Frames.**

A great deal of bad and uneven yarn is made on the drawing frames from lack of proper adjustments and close attention. The rollers should be set at proper distance apart for the length of staple used. The distances apart should be graduated in proportion to the bulk of sliver and the amount of draft between each roller, on medium counts and middling cotton I set my rollers as follows: 1 3-8 inch, 1 7-16 inch, and 1 1-2 inch with good results. The tension between front roller and calenders should be give and take as near as practical. Metallic rollers will allow for more storm than leather, as they leave a crimp that is somewhat more elastic. A great deal of bad uneven sliver is caused by badly adjusted stop motions and waste clogged spoons. When an end runs through back roller without stopping the attendant should remove the spoon, place it in sight on the top roller cover and notify the fixer. (And leave the spoon out until it is fixed).

When electric stop motions don't stop promptly the first aid should be to clean all electric parts, if that don't remedy it notify the fixer. Scour all metallic rollers every two weeks, as dirty flutes make bad sliver. When cleaning don't mix rollers, or change ends, or uneven tension and bad sliver will result. Don't allow hands to use brushes on rollers as it makes dirty work.

Here as elsewhere, keep things clean.

**Slubbers.**

Slubbers should be leveled and lined at least once a year and all parts carefully adjusted. All horse-head trains should have patent washers and good jamb nuts. This also refers to all parts that are liable to jar loose. Much chopped sliver is made on slubbers, as a large bulk is drawn by comparatively small rollers. The strain of the drafts cause a vibration in the rollers which does a great deal of damage to the yarn. This doesn't show in the roving, yet it makes a choppy yarn; the longer the slubber the greater the damage. As to drafts. I draw about one-third between middle and back rollers and about two-thirds between front and middle rollers, thus my draft is 4 to 1. I do away with the intermediate gear between middle and back rollers. In its stead I use two gears fastened together. My back roller gear has 30 teeth, middle roller gear has 19 teeth, my double gear that enters into back roller gear has 64 teeth, my driver that enters into middle roller gear has 72 teeth. This gives a draft between middle and back rollers of 1.42, and between front and middle 2,81. I set my rollers apart as follows from front to middle; 1 5-16 inch, and from middle to back 1 7-16 inch from center to center. I have gone into this in detail as it is a new departure (as far as I know). The results are so good I wish others to try it. As I use the same stand and stud, the two gears are the only extra expense.

The tensions between front rollers and flyers should be fairly slack and uniform from the empty to full bobbin. Slubber roving should be twisted just enough to carry it without break or strain through the next process. Roving guides should be carefully set to traverse a safe distance without any lost motion. This is also true with carriage motions. Do not allow hands to take up or let out tensions, or uneven roving will result. Presser fingers should be carefully adjusted to bobbins. Don't allow help to wrap the sliver more or less than the accepted turns. If an end runs slack, don't allow help to hold their thumbs on roller as it injures the sliver. Break back the end. Careful cleaning and oiling of all parts should be enforced. A dry roller will make uneven work. Spindle and bobbin gears should be cleaned and oiled systematically. Hands should be taught to piece-up ends without leaving thin and hard places.

It is not necessary to treat intermediates and speeders, as my remarks about slubbers cover the finisher drawing. I add these together and strike an average, but as nearly all carders do this I am not enlightening the reader much. What I wish to emphasize is your judgment about changing when weights vary, which they often will. In heavy damp weather laps will absorb much moisture. This can be overcome by making your finisher laps from 1-4 to 1-2 pounds heavier according to the length; don't do this light weight drawing will result. Do not change for every little variation, but let your judgement have good play between the lines. Keep an accurate account of your weights and average them say once a month. This will be a guide to your judgment when your roving weights don't agree with the spinner weights, look for a reason in the spinning room, reel or on the frame. It will be a mutual help. A good spinner will help his own interest by cooperating with the carder. Consult together, give and take advice, and good will result

## Number Sixteen.

By J. O. EDWARDS, Pell City, Ala.

On the subject of uneven yarn, every cotton mill manager, superintendent and overseer should be interested. I am sure that we all realize the importance of a thorough mixing of the cotton to produce an even yarn. This should be done by carefully grading each bale before putting it into the mixing, no matter how small your opening room. Mix as many bales at a time as you can if only five See that they are thoroughly mixed. If you can mix fifty, so much the better. Too much care cannot be given to feeding the cotton to the automatic feeders. Hopers should never be allowed to run lower than half full

at any time, and should be kept two-thirds full all the time.

I want to say here that the picker room has in time been too much neglected, but we have begun to realize that it is the foundation of successful manufacturing. Evenness and regularity of the laps are important to the production of even yarns. The correct weighing of the laps on breakers, intermediates and

**J. O. Edwards,**
Pell City, Ala.

finishers and the proper adjustment of the eveners is essential to good carding, providing however, that all things are in good order about the cards. It is important also to keep pickers clean and well oiled, beaters clean and free from roll, as the latter will cause the cotton to run to one side and make heavy-sided laps, also irregular and uneven laps, because much depends on the condition of the laps when it leaves the finisher picker.

Carding is the next important process and is the back bone of good spinning and of even yarn. After the work has left the carding process, very little can be done, although we have many things in the other processes to cause uneven yarn. On the card it should be made as near perfect as possible. Some of the causes of uneven work are; licker-ins in poor condition, clothing loose on cylinder and doffer, improper grinding, and setting plates stay in poor condition, feed plates rubbing, improper stripping. Cards should be stripped at certain times, set too close, front and back plates and when done, the end should be run into waste until it is full size again Let me say that a good grinder is essential to good carding, for if we do not have the proper setting, we will not have even work, hence we will have uneven yarn at the spinning frames

On the drawing frames we have many things that will cause uneven work, some of them being as follows: gears not properly set; rolls not properly adjusted; too much draft between middle and back rolls; bent necks; badly worn calender rolls improperly set; stop motions not working as they should, allowing singlings and doublings to pass through; poor piecing, both at the front and back trumpets too large for weight of sliver being made, so that the sliver is not condensed as it should be; top and bottom clearers not kept clean; chops on top and bottom rolls, whether steel or solid, not being the same diameter; rolls not properly spread for staple being used. All of these are causes of uneven yarn and should be looked after.

Next we come to the slubbers, intermediates and roving frames. On these we have many things that will cause uneven work. Poor piecing at slubbers on back, long splices on roving frames when setting in full bobbins, hard ends, skewers blunt on end, causing friction on the roving and stretching; top and bottom clearers not kept clean; poorly cleaned top leather rolls; rolls of varying diameters; laps on back steel rolls; rolls not properly oiled, and put in with laps running the wrong way; rolls bent; loose joints; worn necks; tension too tight (frame hands should not be allowed to take up or let off on the tension) improper wrapping of the end around the presser finger, bad bobbins and not filling properly; flyers not being kept clean and the barrel sides having chocks on them; frame hands fanning off at any or all times; roving guides partially filled with waste; machines not kept clean and well oiled; spindle and bobbin gears not properly set; back lash in gears; running top rolls with grooves in them; and not changing bottom cone gear and

builder gear when changing from coarse to fine roving.

We now come to the spinning frame. The work may be made ever so well in the card room and be ruined in the spinning room if the following things are not looked after and kept straight: Broken creel steps; blunt skewers; long pieces when setting in full roving; skewers left in creel board, thereby causing friction and stretching the rovin;allowing spinners to fan their frames at any or all times; roving guides partially filled with waste, causing unevenness in the yarn; rolls not properly covered and of different diameters; saddles not properly adjusted on rolls; stirrups rubbing against steel rolls; bottom steel rolls not kept cleaned and well oiled; running top rolls with grooves in them; weight levers not properly adjusted; too much draft; guide wires worn and not properly set; travelers too light or too heavy; worn travelers, worn or loose rings; spindles crooked or out of center of ring; bad steel rolls, such as flutes and necks being worn; loose joints. All of these causes are common and can be remedied by the overseer keeping constantly on the alert.

## Number Seventeen.

By EUGENE HERRING, LaGrange, Ga.

In discussing this question we are discussing one of the most vital questions concerning the cotton mill.

Leaving out the gouts, which are mostly caused in the spinning room by carelessness in putting up ends, running without scanvenger rolls, or fanning off frames while running, the thin places in the yarn cause at least 50 per cent of the yarn breakage in the weave room.

The most of the twist runs to the thin places, which makes the twist at that point excessive. And by the time the yarn is run over the spoolers, warpers and slashers, these thin places are dead and brittle, and easily broken. By being twisted so hard they don't absorb the size in slashing, even if they don't break in these processes ,which they do to a great extent, causing laps and lose ends in the warps that go to weave room. It is impossible to make good section beams on the warpers when the ends break excessively. And it is just as impossible for the slasher man to make good warps for the weave room.

If the yarn is weak when it leaves the spinning frames, it increases in "badness" with each process that it goes through from there on. As each process from spinning frame on, is a wearing and stretching process. The strengthening and building process ceases when it leaves the spinning frame. But these injuries are partly overcome by the sizing at slasher if properly done.

The weave room becomes the dumping ground for all the carelessness and mistake of the whole shooting-match fr m the man that bought the cotton on down to the slasher man. The opening and mixing, picker room, cards, drawing frame, slubbers, speeders, and spinning, each contributing its share of bad work and causes of uneven yarn.

To start with, I know some mills that have their cotton bought in a haphazard way, not paying much attention, if any, to the length of the staple of each bale. They just pick it up in job lots as cheap as possible.

If there is too great a difference in the shortest and longest staple it is a mechanical impossibility to get a mixing that you can produce even yarn. Intelligent, careful mixing in many cases will partially overcome the buyer's mistake. This first mistake though is like all the balance made in the different processes, the evil once done can not be entirely eradicated in any of the processes following this one mistake. Once wrong, it will go through wrong. I will not attempt to go into all the settings of the different adjustable parts of the picker room and card room machinery, as there are no standard settings that will apply to all classes of work and conditions. Keep the air currents right, the beaters at right speed according to class of work, and on any class of work keep the evening mechanism on the pickers in perfect working condition.

Good horse sense and care is needed here, and this properly applied will get out some good laps for the cards.

But I think the majority of the thin places in the yarn is caused after the stock reaches the drawing frames. The setting of the rolls from the drawing frames, the settings of the rolls from here on is responsible for even or uneven work. Roving stretched on any of the machines is ruined for making even yarn. Roving with excessive twist in it will not draw evenly when being spun. The rolls on spinning frame set too far apart for the length of the staple will make uneven yarn. Rolls set too close will make the same or cockled yarn, which is worse than yarn with thin places in it.

Here is where the bad mixing shows up in his best clothes and makes it impossible for the spinner to set his rolls to suit the stock, trying to get through his machinery. If he sets his rolls for medium length staple and a bunch of extremely short hits him he is up against it. If extremely long hits him he is into it again. Though the best he can do is to neutralize his rolls and make them as friendly to both extremes as possible. And then the long, hard twisted staple will come through his rolls "pigtail" fashion and ruin his shell rolls.

I don't think it is a mechanical possibility to make perfect yarn, technically speaking; but by intelligent team work from the man who buys the cotton, on down the line to the spinner, it can under normal conditions be made even enough to get out a good product in the weave room and make cloth up to the requirements of the customers of the mill.

So much for the machines. Poor things, it is a pity some time that they have to do so bad and be blamed for doing the very thing that it is set to do, it is a pity they can't adjust themselves some times, but as it is they depend on man to set them, and if the man in most cases would do his part as accurately as the machine, we wouldn't have very much uneven yarn. So the big trouble after all is the human machine. To start with, the cotton buyer buys promiscuously. (There are exceptions, of course). The carder "bats 'em" through to get a big poundage for his report at low cost. (Which in some cases would be costly to the mill company, if it was put through free gratis). He gets his poundage O. K., and says his weights come pretty even, while they may, but that is no sign the quality is right to make even yarn.

The spinner takes the product in hand and goes through the same process of "batting 'em" through without much, if any, thought of the man that has to follow him, just as the carder did him. Both getting by with good production in pounds with low cost, and the consequence is bad running work the rest of the way to the cloth room with a lot of second-class cloth. A lot of correspondence between the selling house, mill agent and the mill customers, and some times a loss of good customers, and a bad reputation on the market, and in dull seasons close down.

Team work — intelligent team work—is needed in the mills, and will do more to cut out uneven work than any one thing. Each man in charge of the different departments should strive to give over the product to the next man in as good condition as possible. Everybody from the cotton buyer down should have one object in view, viz., to have the finished product first class. I am sorry to say that some superintendents pinch down on the carder so close on cost that it is almost impossible for him to get a satisfactory production in pounds and make it A-1 quality. The same is true of other departments.

Another common thing in a lot of mills is unbalanced machinery. Not enough opening and picker room machinery. Not enough cards, not enough drawing, some shortage that necessitates over-speeding the machines that they are shy on, making the laps too heavy, and various schemes to make the weak part keep up, which throws the drafts wrong on a lot of machines. All this makes bad work, uneven yarn, and causes a big loss to the company. Sometimes they lose dollars to save cents.

I am not knocking, but it is the human machine that is causing most of the uneven yarn and poor quality goods from the mills of the South to-day. Get the right kind of superintendent and let him and the men in charge of each department work together in a friendly, business-like co-operative way. Carry instructions and orders down from the head—the superintendent or manager—down to the other end of the line in a military fashion. It won't be long until every thing will be

working smoothly with even yarn and good business.

But I am about to get off on another subject, so I will quit.

## Number Eighteen.

By J. L. DAVIS, Easley, S. C.

In taking up this discussion, we have a broad one. There are so many causes for uneven yarn and also so many ways in which these causes can be eliminated. The first and one of the most important things in making even yarn is to use good average grade cotton. We all agree that a short, immature, irregular length staple will not draft even and make a uniform yarn. Another point very often overlooked is the mixing of the waste. We take the sliver and roving waste from the card room, the seavenger roll and cut roving waste from the spinning room, and in many cases there is an unusual amount, carelessly thrown in. This waste, as it is being fed from the opening or breaker room, is not mixed by the hopper tender and passes on to the different processes just as it was carelessly thrown on your pile of stock. Consider the results that will arise from this alone.

Beaters on picker should not be set close enough to damage the stock, but by no means should they be set too far from the feed roll. In the latter case, the beater will deliver the stock to the card in thick and thin flakes, making an uneven lap. In turn the card passes this uneven lap on to the drawing and roving frames. The more this uneven lap, drawing or roving, is drafted, in many cases with an excessive draft, the more and longer thick and thin uneven stock is delivered to the spinning. Drawing frames should be watched closely for lapped rolls, weights dropped when frame is running, gears worn and not set properly, too much tension on sliver between delivery and calender rolls. These are great evils and in the end will result in uneven yarn.

Now we come to the different processes of roving frames, where from time to time, if we are not careful, we will make uneven roving.

Take the drafts. They are often made to supply the place of another slubber or intermediate roving, or jack frame, or whatever the case many be, with long overdraft, insufficient twist, old and worn roving skewers, trying to deliver roving to the next process. Let us not suppose that all roving processes are in such condition, but in many cases they are. Can we expect even yarn under such conditions?

There is nothing like plenty of twist, all the way through on the different processes, especially the finer roving and jack frames. We have rules and ways to establish a twist to suit each number of roving, better known as standard twist. However, we cannot use this standard twist any more, especially where the average 7-8 to 1 1-8 inch staple is used. Should we undertake to do so with the above mentioned evils, uneven roving and yarn will be the result. One great evil many a mill has to contend with, and is contending with today, is leaving the section man on the job at noon and night and allowing him to put on a larger twist gear in order to gain on the next process, not counting the cost in stretched, uneven roving, and yarn, short production on weaving and high percentge of seconds. There are causes that exist every day at many mills, yet they wonder why they have uneven yarn.

One rule I believe should be observed is that no twist gear in roving or yarn department should be changed without the knowledge and consent of the superintendent, in order that he might notify the next man in charge who received such roving or yarn. There is no end to the uneven yarn and roving that has been made and is still being made under such conditions or changes. A great evil we have and one often overlooked is operating roving machinery with too tight a tension. Oftentimes we have seen frames running where the ends would become so tight that they would break at the flyer presser. Where this is the case, how many yards are delivered to the next process, or spinning, unevenly drawn or stretched?

Insufficient lubrication of both rolls and saddles on spinning and roving frames is responsible for a lot of uneven yarn. We have seen where the mandel or shell roll, or even the solid roll, become very

dry for the lack of oil. As the frame moves off the rolls will lag, or be slow in starting, thereby causing uneven yarn in whatever the case may be. Bad rolls, flat or poorly cemented cots, cloth not evenly cut, flat-sided rolls are responsible for their part of uneven yarn.

I will not say very much about the spinning, as we have already discussed the spinning problems where they exist, along with the roving frame problem.

In closing, I will say that these are simple remarks, but practical, things which we come in contact with more or less every day.

## Number Nineteen.

By PAUL NUCHOLS, Cordova, Ala.

Primarily, the cause of uneven yarn is the uneven length of the fibres in the cotton, which is caused first by soil and cultivation, then by being gin cut, and last, but not least, by being cut and pulled in two through the different machines it goes through before becoming yarn. If we could get cotton cultivated exactly alike, grown on absolutely the same soil with the same seasons ,and only the fully open, mature bolls picked and properly ginned, and then run through absolutely perfect machinery, including combers, we would have perfect yarn. However, since this is not likely, I will discuss the best way of handling cotton bought here and there and run through the machinery of the average equipped mill, not including combers.

To save space, I will discuss things to do to prevent uneven yarn, for if certain things will prevent it, then not doing them will cause it. To start with, do not buy gin cut cotton. Grade your cotton into at least three grades as it is put in the warehouse, or later. These should be the longest, shortest and medium staple, or the lowest, highest and medium grade. Then take the same percentage of each kind for your mix, that is if you have 2,000 bales, one grade 1,000 another grade, and 500 another grade, and are running 35 bales a day, take 1 per cent of each lot for your days run.

Now the machines in the opener and picker rooms were put up clean, level, oiled and in good shape. Keep them that way by adopting rules for cleaning, oiling, feeding, weighing. That will take care of your machines and your weights. See that these rules are carried out. Have all worn bearings replaced with new ones. Get your work through the picker room right and then have a way to carry your laps to the cards that will not tear them up. Be sure that the card tenders start them in the card right, as a lap properly made will not split. The same thing can be said of all machinery that the cotton goes through. The machinery is carefully put up by a shop which has a reputation to maintain and if you will adopt a set of rules to keep the machinery in as near that shape as possible ,it will help more than anything else.

The cards should all be kept set alike ,even to all the different combs being run at the some height. The wire should be kept tight and sharp. The sliver ends should be broken down at stripping and the cylinder allowed to fill up before piecing. Drawing should have a section man with it all the time, as it must be kept level, clean and properly oiled. Every stopmotion must be working, every part of every frame kept set alike, with the rolls spread to suit the length of staple you are running. Worn bearings and nicked rollers should be replaced, especially must the bearings, for the drawing and calender rolls be kept in good repair.

Slubbers, intermediates and fine frames must have a system, or set of rules for oiling, cleaning, and leveling that will take care of them. The rolls, both top and bottom, must be spread to suit the average length of staple being run, and the tension kept without any pull to it, but not slack. The top rolls must be kept in perfect condition and always sized when they are changed.

The same things can be said of the spinning. It must have rules for everything, oiling, cleaning and leveling ,to keep the machines mechanically perfect. The rolls must be spread to suit the staple and top rolls sized when changing.

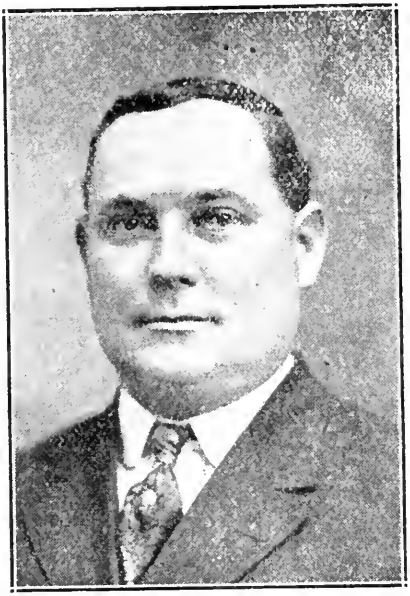
The average overser knows how

to keep his machinery up, and make rules to run by, but those who get in trouble do not see that their rules are carried out. You have to have team work among the employees, so that each man knows just what to do and when to do it, or you have not an up-to-date room.

## Number Twenty.

By C. H. STRICKLAND, Belton, S. C.

In discussing the subject, "Causes and Prevention of Uneven Yarn," I will begin at the opening and mixing room, supposing the grades of cotton have been properly mixed, as this is the foundation from which to start an even yarn. The cotton not being uniformly mixed will



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Belton, S. C.

cause an unevenness that cannot be remedied throughout all the processes.

After the stock leaves the mixing room, it is delivered to the automatic feeder in the picker room. If the feeder is not kept in good running order and properly fed, it will cause a lot of uneven laps, which, of course, make uneven yarn. The automatic feeder hopper should have as near the same amount of cotton in it all the time as possible, because when it is full it will feed heavier than it does when half full or nearly empty, so if the hopper is filled up and then let run nearly empty before it is filled again, you see you have an irregular lap. The proper way to keep the feeding as uniform as possible is to feed the hopper about two-thirds full, then keep it as near that all the time as possible, and you will get a very uniform lap.

This first lap we will call the breaker lap. Suppose we have a uniform lap from the breaker; it is then put on the intermediate where it is still liable to be made uneven if the proper care is not taken, but if the fan drafts are kept well regulated so that the cotton will be laid on the screens in a uniform sheet, the lap apron in good shape, the laps not allowed to run three to the apron when four is the right number, the evener motion in good condition, the beater set properly to the feed roll—there is not much chance for an uneven lap from the intermediate.

These same rules apply to the finisher picker. The finisher laps can be as near uniform as possible and then not give an even sliver from the cards, unless the card is in good shape in regard to the wire being sharp on the cylinders, and the flats and licker-in and settings all accurate. The licker-in is one of the most important parts about a card when it comes to cleaning the stock and giving a good, even sliver. It is very important that the wire on the licker-in is kept sharp and be sure that there are no high and low places in it that would prevent a close setting to the feed plate. If the licker-in is uneven, it will jerk the cotton from the feed plate in an uneven sheet and an uneven sliver will be delivered from the doffer. A close watch should be kept on the lap between the lap roll and the feed roll, also on the web between the doffer and bottom calendar rolls and coiler calendar rolls, to be sure that no unnecessary or irregular strain is on the sliver, caused from lost motion in these parts. The trumpet in the coiler being too small for the weight of sliver being run, will cause excess strain and uneven work, also the

roving cans being allowed to run too full and press too tight against the coiler will cause uneven yarn. All cards running on the same numbers of yarn should, as far as possible, have all the settings made the same, and even then there will be a slight difference in the weight of roving produced from each card, but it is impossible to get exactly the same results from a number of cards, although this variation can be reduced by careful setting of all the cards.

Lap splitting is a big cause for uneven yarn and should be remedied in the picker room at once. When a lap runs out on a card and a new lap is to be put on, it is very important to see that the card hand makes his piecing just right to avoid a thick or thin place in the sliver.

The next process in most mills on coarse and medium numbers is the drawing frame, which is one of very much importance, even more so, I fear, than most carders realize, as this process is the last opportunity we have to correct, to any great extent, the unevenness of the sliver. Therefore, it is very important that a great deal of attention is given this process. There are usually two processes for coarse and medium numbers; only one needs to be discussed as they are principally the same. One of the first things I wish to mention on the drawing frame process is the draft. More uneven and weak yarns are made from excess drafts than any other one cause in all the processes. Regulate the drafts according to the staple used. On the drawing frame the draft usually equals the number of doubling, but for metallic rolls, allowance should be made in the figured draft, the draft on metallic rolls being greater than the figured draft, due to the flutes on the rolls. To illustrate: If figured draft for a given drawing was 6, using metallic rolls I would draw about 5.85 with 6 doubling. The setting of the rolls is also important. The distance between the centers of the rolls should be regulated to suit the staple being used, the bulk of cotton being drawn, and the speed of the rolls. It is a good idea to have the cans so arranged at the back of the drawing frame that the full cans of sliver will be at the back of the ones not so full, then when one of the cans next to the frame runs empty, just remove it and push all the remaining cans to the front and set the full can at the back. In this way the slivers are prevented from dragging over the tops of full cans and stetching them, causing uneven places in the yarn. When using metallic rolls, in the course of time the collars will become worn and let the flutes too deep in the mesh, causing the sliver to sag too much and occasionally it will lap and run through the trumpets double, causing thick places in the yarn. A simple remedy for that is to file off the tops of flutes on the roll a little, being careful not to do too much, only enough to put the sliver back to the right tension. All worn gears or bearings should be replaced with new ones, as lost motion from these parts puts excess strain on the sliver, making it uneven. The rolls should be cleaned and oiled regularly. The stop-motion should be kept in good repair so that when a sliver breaks back, the frame will stop suddenly and avoid a thin place by not letting the end run through the rolls before it is pieced up again. The drawing hand should be taught how to piece up the ends when they break down so as to avoid thick places caused by making too long a lap in the sliver. When several different weights of the card sliver are used, be careful not to get them mixed, as that would cause a big variation of the yarn. The fly frame processes are all principally the same and uneven yarn will be produced by them from any of the following causes: extreme draft, rolls not spaced to suit the staple of cotton, loose joints in steel rolls, rolls not properly cleaned and oiled, weight saddles worn and not oiled regularly, weights not heavy enough for stock being drawn, lost motion caused by worn gear or bearings, bad roving skewers, uneven tension and roving laid too close on bobbin. Most of these causes will apply to the spinning process also. If all of these causes are remedied on fly frames and spinning frames, with rings and spindles set properly, I do not see much reason for uneven yarn at either of these processes.

There is also an unevenness caused by variations in humidity due to changes in the weather. To illustrate: When it is raining, the laps in picker room will absorb from a half a pound to a pound of water, which will dry out as the weather clears up, leaving the lap a half to

a pound shy of actual cotton. They will gain more from a warm rain than from a cold one. When these laps that are made during a wet day, reach the roving and yarn and are mixed in with the roving and yarn that are made from laps made on dry days, it will cause both irregular numbers and uneven yarn. Some carders try to remedy this by changing draft gears on the different processes, but that is not a good practice, as he does not know just when to make these changes in order to keep yarn even. A tooth in the draft gear usually makes too big a change anyway. The best way to remedy this unevenness is to have a standard weight for the laps, then on wet days watch humidity and as it increases, increase the weight of the laps accordingly; say, start at one-quarter pound heavy, then if humidity continues to increase, go to one-half or three-quarters heavy or during long wet spells it is sometimes necessary to have an entire pound—then when the weather clears up and humidity decreases, the laps should be lightened accordingly. In this way very nearly the same amount of cotton can be kept in the laps all the time. When roving and yarn are weighing heavier on wet days, the drafts should not be changed as it is water that has increased the weight and it will weigh all right when the weather dries up.

In conclusion I will say that to get an even yarn it must be started right and kept right, especially in carding and spinning processes.

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**Number Twenty-One.**

By R. F. HARRIS, Lowell, N. C.

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Causes and prevention of uneven yarn is a broad subject. There are many causes and many terms used by buyers and weavers as to what constitute uneven yarn, such as thick and thin places and mixed numbers counts varying. The causes are many and can be found in all departments of the mill. Uneven yarn will result from an improper mixing of any kind, especially of compressed and loose bales mixed in the opening room, unless the compressed bales are thoroughly loosened up, which is seldom or never done. When the two are fed to the opener in their natural state the compressed will go through leaving the loose bales, and causing an uneven lap to start with. To prevent this, run the compressed and loose bale cotton separately through the opener and mix on the intermediate picker, which is the only way to thoroughly mix more than one grade or staple of cotton. If inside of machine gets dirty or air passages become choked, it will cause uneven laps. To prevent this clean inside of machine at least once a week and air passages should be cleaned every day. There are many ways to make an uneven card sliver, such as: (1) Cards not all drafted alike. (2) Clothing dull and settings bad. (3) Laps too heavy per yards and draft too long. (4) Laps doubled at back when replacing and cans running too

**R. F. Harris**
Lowell, N. C.

full. (5) No regularity about stripping. To prevent this see that all cards have the same draft gear on side shaft.

Grind before the clothing is dull and set every card as near the same and as close as condition will admit. Run a light lap and short draft, which is best, especially on long cotton. Have operatives put ends together and not double when replacing laps. Have the cans changed before they are too full.

Have the cards stripped at regular intervals. When the wire is full the card is producing uneven sliver and dull cards fill quicker than a sharp one. When stock is combed much uneven work is made in the sliver and ribbon machine, by the drawings rolls being improperly set and not being properly varnished with a good varnish. This causes thick and thin places. When the aspirator is used on the comber and the air passages become choked or some combers taking out more waste than others causing the ends to run slack on the table and invariably the wrong thing is done by changing the gear to make ends run tight, thus causing more uneven work. The waste should be taken on each comber once a week to ascertain if they are all taking the same percentage of waste. If not, correct the evil. Do not add fire to the flame by changing the gear to make the ends run tight. Much uneven work will result from drawing frames if not properly looked after. such as roll speed too high, causing the rolls to jump. And having the sliver such that will cause the bulk of cotton being fed to be too heavy, will aggravate the above cause. The hole in the trumpets being too large will cause the ends to run tight, stretching the sliver. Another cause of uneven sliver is the second or third roll collecting until it has a lap across the whole surface, running sometime from one clearer picking to another. If the roll weights are not kept evenly hung, the rolls will jump, causing thick and thin places in the sliver.

We will consider slubbers, intermediate roving and jack frames under one head. There are many things in the speeder room that can cause uneven yarn. The tension is mostly considered the source of most of the uneven roving and it does play an important part. If some of the ends are tight enough to break there are thousands of yards stretched almost to the breaking point. It's a bad practice for speeder tenders to take up catches to make ends run tight. The first few layers of the set stretching and making uneven roving. Rolls becoming dry or waste being put under clearer or anything that will retard the action of the roll will cause a much heavier roving. Too heavy a slubber roving run on intermediates with short draft will cause an uneven roving. Singling and doubling from speeder cause lots of uneven yarn, and every superintendent and overseer has had to deal with this trouble. The best remedy is to dock the hand that makes them and pay the one that finds them. Pay twice as much for doublings as singles. As some of the singles will break at the succeeding process and doubling will not produce a very undesirable yarn.

A bad leather roll will cause uneven roving because the roll does the drawing out of the fibers and it is false economy to use cheap stock in roll covering. Rolls should be all spaced alike for if one speeder is set closer than another, it will cause a much heavier hank roving. As to spinning it is a continuation of drawing and much can be done and left undone that will result in bad and uneven yarn. Rolls improperly spaced, or rolls not all spaced alike on the same counts, spaced too close will cause knotty yarn. Too wide will cause thin and thick places. Rolls should be cleaned and oiled periodically as anything that causes the roll to dwell will cause uneven yarn. A bad leather roll will cause lots of uneven work and should never be allowed to run if grooved or worn. Use plenty of rolls covered with the best material to be had and this alone will prevent lots of uneven yarn. All lint and fly should be kept if possisible off the yarn as it causes thick places which is uneven yarn. For this reason the ceiling motors and shafting should be cleaned at noontime. The sides shouldn't run too long before brushing not the sweeper allowed to knock under and drag out from under more than three frames. If allowed to go the whole width of the room the accumulation is so great that lots of the lint will be caught up by the bands, then on the yarn causing thick or uneven places. The yarn should be handled with care after it leaves the

spinning. The spindles speed on spooler should not be such that will cause the yarn to stretch or the guides set so close as to chafe it and different counts can be mixed at the spooler, causing an unevenly twisted yarn. After the yarn is delivered to the twister comparatively even, it can be twisted in such a way as to make it uneven, such as doubling and singlings are slack bands, causing slack twist. Another way much uneven yarn is made is by getting the different counts mixed after they have been twisted. This can be avoided to a certain extent by having different colored bobbins for each count and twist. These are a few of the causes and preventions of uneven yarn in a yarn mill.

## Number Twenty-Two.

By J. A. SORRELLS, New Holland, Ga.

Cotton should all be graded. Get the average grade and mix to suit the grade. Set the machinery or rolls to suit the grade and mix as many as 10 bales for a mixing, using a little off of each bale at a time. If possible, mix today what you need to run tomorrow.

Keep the opener or breaker hoppers evenly fed, preferably about 3-4 full, as heavy feeding at different times will cause light and heavy laps. If you use the trunk system, see that your drafts in the fan flues are kept clean, and that it loses no draft, so that the cotton can be evenly spread on the condenser screen.

White drawing or roving as well as scavenger roll waste should be mixed in even during the day's run.

Have the fan speeds in excess of the beater drafts. Let the fan speeds or drafts just take care of the draft of the beaters at all places, so that the cotton will not float around over the screen, but be strong enough to catch the cotton as the beater knocks it over and sucks it to all little open places in the screen, as it revolves. This assures you of an even spread. See that the discharge pipes are kept clean, watch the blowouts on the sides of the draft flues, commonly called "back draft."

The lapping of the aprons should be done by having two about half full and two full, which gives you a uniform weight on your aprons, assuring you of good running of the aprons, and no slips by being overweighted at one time and overrunning at another.

In lapping up full laps, it should be done by letting the end just running out just come together, end for end ,with the one you are putting on. Avoid broken gearing in the feed gear, slack evener belts, bad oilings, or bearings running dry and sticking up, evener gearing not being kept in good shape.

The clothing on the cylinder should be good, tight, firm and elastic, as soft or weak fillet cannot stand up to it and card the stock out properly. The clothing on the cylinder doffer flats and the licker-in should be sharp and truly set to suit the amount of stock going through it. Uneven settings mean uneven yarn. If the licker-in has badly mashed places or parts of the strands of the teeth out, it will cause cloudy, unevenness.

Fanning or running up and down the card alleys will cause the sliver to break, and loose matter to float in. The sliver, once broken, drops down a trifle and is more than likely to catch on in a bit and double back in, causing thick and thin places. Cards not being stripped cleanly and regularly will cause them to fill up and not do their duty in properly carding the fibres out. Flats ground down too low before reclothing will loose their carding strength, and the same is true of weak cylinder fillet that has gotten soft and rotten.

The ends should be broken down at the coiler heads while stripping out the doffer. Then they should be carefully pieced together after it has run enough to come the usual size.

In setting the laps on the back of cards, care should be taken not to let the old laps, or the last part of the one on the card, run entirely out, as it is thicker than the other portion of the lap. About 36 inches should be broken out and put in the white waste, then the new laps carefully pieced end for end. Worn out gearing on the feed

roll shafting will cause irregular feeding of the laps, making uneven work.

Running the cans too full, makes friction against the coiler, straining the sliver, and making it uneven.

If split laps are allowed to run, then straighten out on the back of the card and the uneven sliver not taken out of the cans down to where the sliver was before it split, the sliver will be uneven all the way through. Doffer combs run too high will stretch the sliver. A little waste accumulating on the cylinder screen next to the doffer, as it usually does, will cause it to rub against the doffer as it revolves and cause bad selvages, or if in the center or anywhere, will cause little holes in the sliver and eventually pull off and go through. This means places with little holes in it, and others with lumpy places. When such places are found, the card should be stopped and the dirty and rough places wiped off.

First of all have the frame rolls and gearing wiped clean, good gears, and gears set properly. Dirty drawing frames mean cut or uneven sliver, which is also true of bad gearing or poor gear setting. Then if the frames are not kept oiled as they should be it means dry rolls and vibrating rolls from being dry, causing unevenness. Calender rolls drawing the sliver too tight will cause stretched places in the sliver. Some trumpets being bored too large while others on the same frame are smaller, will cause some ends to run too tight, drawing thin places, while others run too slack and sag, occasionally catching up by looping through the trumpet making a knot in the sliver.

Excessive speeds, creeling not properly done in the cans on the back of the drawing frame, making doubling or singling on creeling them, all means uneven work.

Drawing frames should be creeled in all at one time by carefully piecing the ends together. When calender roll necks get worn down it is hard to get even work. Keep the knock-off motions working properly. Cans which are rough at the top will cause the cotton to chop off and lumps form, and from time to time they will find their way into the sliver.

One thing, is to try to keep good and reliable hands on the job, just the same as you would pick out one for the roving frames, and try to educate them to the meaning of and the necessity for, good work, at this machine.

Slubbers, in some respects, will include the intermediates, speeders and jack frames. First of all, we must have all gearing in good condition, and then set well, so it will not slip or crawl and quiver. Do not draft too long, or have any more twist in the roving than is necessary to keep it from breaking back at the next machine, as hard twisted roving is hard to draft out. Then the proper tension is to be considered, as it is one of the most essential things on a roving frame of any kind. Start the frame off at doffing time with the ends just wavering a bit, then use the proper tension gears to carry the cone rack out until the bobbins are full. That will give you the same soft tension without any stretching. Doff them just before they fill out to the finger.

Caliper all bobbins and use none that will not caliper within one thirty-second of an inch of one another. Then you can set the tension very close and keep it. Allow no roving frame hand to put chokes up under the clearer boards to squeeze up on the shell rolls to make some end stay up that has been broken down for a change or two of the carriage. Clean and oil the arbors or mantles once a week, which also applies to the back and middle rolls. Keep the chokes out from the solid rolls and under the saddles and see that the latter have oil on them at all times. Also see that the stands on the steel rolls are kept oily and clear of chokes around the stands. The flutes should not be scarred up, the necks in steel rolls should be good, so as to allow no back lash, and the roving traverse in good working order.

See that the spindle and bobbin gears are oiled regularly, also the spindle steps. Never allow them to become dry, or any other running parts on the roving frame. In creeling the roving frame see that ends are pieced together and not stuck in, thereby making a three-ply creeling, instead of a two-ply. Have good skewers and good skewer steps, as inferior ones cause the bobbins to pull hard and stretch the roving. Use the same precau-

tions as to oil, gears, tensions and other causes on roving frames, as mentioned above.

Try to prevent strong winds blowing through the windows into the room, as they cause flying lint and waving ends at different places. Some ends will be irregularly broken down part of the end will catch in and draw itself into the running stock, especially on cards and drawing frames, causing uneven work.

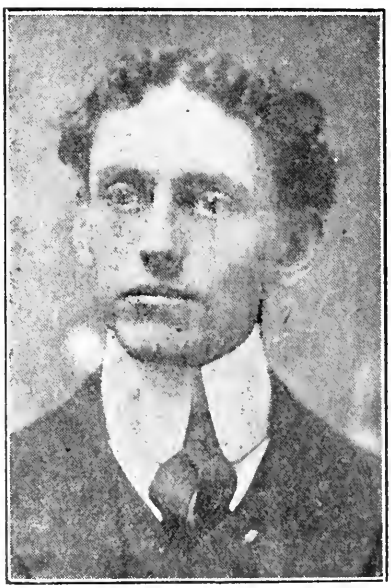
Try to keep the temperature of the room as near constant as possible as the conditions will allow. once you get the average temperature, you have but little trouble with the drawing and roving frame tension, which is one of the most dangerous things to even yarn.

The leather top rolls should all be calipered, the shells matched, the flannel of a regular thickness and cots stuck so as to allow the laps just to cover and run them off of the laps instead of against the laps of the cots. They should be stamped by the roller shop man to show which way the cots are stuck.

Spinning frames are almost similar to the roving frames. First, we must have good gearing and good settings. Then good leather rolls and good oiling of top rolls and keep them clean, also good banding. Do not allow slack banding. Use the traveler that runs best, and 99 times out of a 100 it is the traveler that should be used, for good spinning depends a lot on a well suited traveler, the quality of roving being good. Fluted top rolls should not be used. The oiling should be kept up with on all parts. Spindles kept set right, plumb, and guides to suit the spindles or directly in terms with the spindles. Keep the roving traverse in good working order, the skewers and steps in good condition. Allow no fanning off and be very careful in wiping off guides. It is hard to make even yarn with loose bolsters and dry spindle steps. The setting on all rollers in either the carding or spinning should be just so wide as to escape the staple. Use no excessive drafts on any drawing process. The shorter the better, to a limited degree.

## Number Twenty-Three.

By N. L. WHITTEN, Elberton, Ga.



**N. L. Whitten**
Elberton, Ga.

The cause of uneven yarn starts with our cotton buying system. In most cases the buying is done by one who is ignorant of the spinning of even yarn and the importance of a uniform length staple, as well as fully matured fibres. He is partly guided by a very small fraction of a cent per pound, which should not be considered in cotton buying. The difference in the cost of the stock will more than overbalance the loss in waste and seconds if we pretend to make even yarn. Stains are not to be considered. It is the length of, and the quality of the stock, and yet just as important is the uniformity of the length of the staple. If we use 7-8 inch to 1 inch, or 1 1-8 inch staple, the cotton buyer should set up his standard and stick around it as close as he can. He should have a knowledge of the trouble the carder and spinner will have trying to find the right setting of the rolls in order to draw even sliver roving and finally yarns from a great variety of lengths of staple.

The opening room should have space enough to permit opening as

many bales as we have grades, to be spread in as thin a layer on the floor as can be reasonably done quickly by hand. One grade directly on top of the first grades spread and so on until all grades are open and spread. When used in the hopper, the cotton should be used down through the spread to the floor. The hopper should be kept about two-thirds full at all times to insure as uniform breaker lap as possible, so the evener mechanism will not have to jump from one extreme to the other. As we know the evening process starts right here and cannot be attended too closely. The beater speed should be well down, as most carders are running the staple by excessive beating. The air currents should be understood and watched carefully to properly carry cotton to the screens and insure an even lap.

All finisher laps should not vary over one-third of a pound. If they vary more, they should be promptly returned to the back of the machine and run over again. The foreman in charge should watch this process here if he expects to hold his weights in the latter processes—and made even yarns. Laps should be handled with care to the cards, as ragged edge laps mean unevenness, and weak work on through.

Cards should be well-cleaned and oiled, and above all else, the cards require the most delicate settings and the very highest skill in grinding. We must not stint our grinders on fillets. His grinding rolls should be covered with the best fillet and kept in good shape at all times, regardless of the cost of doing so. We should encourage him to use new fillet unsparingly, for it is the best investment we can make. It has often been asked how often should cards be ground. The time to grind is before they get dull. If we expect good carding we must keep the cards sharp and free from hooked teeth. The teeth should be well burnished. Very few agree on the best setting, but we can get good results from almost any of the close settings, if we adopt a standard setting and stick to it. Uniformity in card settings means uniformity in evenness.

The trumpets in the coiler head should condense enough to admit as much sliver in the can as possible, to insure against stretching the sliver when it goes into the drawing frames.

Drawing frames should be well cleaned and oiled. Rolls setting and draft here means more than is appreciated and should be attended to by the foreman personally. If the draw frame does not deliver a good sliver, find the causes and and remedy same before you ruin the future process. The trumpets condense the sliver in a compact here should be small enough to strand, but not enough to stretch it. All trumpets on drawing should be of a uniform diameter, in proportion to the weight of sliver passing through them. Uniformity means evenness. The stop-motions should all work quickly and accurately and the sliver in the cans should be handled with great care to the slubber. Set close the rolls for the length staple, and keep good leather rolls on at all times. If you expect even roving, use good rolls, and keep rollers oiled well, and clean.

Above all else watch the tension, as more unevenness is caused by carelessness in attending to the tension in slubbers and the following roving frames than any other thing, except overdraft and too much twist. Paintaking efforts are required here by a close observer, as we have changes in atmospheric conditions that will ruin the future evenness if not arrested. Cleanliness should be our slogan throughout the roving processes. Take an interest in the skewers. They should be kept pointed and free of lint so as not to stretch the roving. The same thing applies to the spinning skewers. After cleaning, lubricate and watch them run.

Set rolls as close as the stock will permit, and above all, do not use bad rolls. Replace with good ones, all which are worn or badly covered and keep bands on spindles tight, with spindles plumb and guides in center. Use a traveler heavy enough to keep the yarn from chaffing against the separators, or you can expect unevenness here. Spinning rolls must be picked at regular intervals and kept cleaned and well oiled, not oiled at. The weight levers and weights should be looked after closely and travelers changed often. Do not wait until they wear out.

When we have efficient cotton buying, grading and mixing and

system throughout the carding and spinning, with close co-operation with the superintendent, even to the details, we will have attained something worth while, and when the yarn is examined, we will find that it is reasonably free from imperfections.

We should not stint on card fillets, grinder fillets and comb belts, rollers and travelers. If we do, the result is uneven and weak yarn.

It is the little things that get by us that cause uneven yarn. So, if every one connected with the mill, from the president, cotton buyer, on down through the mill, will get on his efficiency cloak, stay on his tiptoes and watch the results with a thought for the poor devil in the weave room, who is supposed to make 99 per cent perfect goods from imperfect yarns.

## Number Twenty-four

By R. A. WHATLEY, LaFayette, Ga.

To prevent uneven yarn altogether, we first have to get our farmers interested in manufacturing to the extent to realize that mixed staple will affect the manufacture of his product.

To prevent uneven yarn, we must first have it to contend with, and then prevent it. We are then

**R. A. Whatley**
LaFayette, Ga.

able to tell how we did it, and to know the cause we must first execute our ideas and see if they are the remedy. Then follow up the remedy until we find the theory is right, apply the remedy, and see if it will do the work. Such is the experience that I am going to mention.

### Cotton and Its Faults.

We have in one farming section, with which I have had experience, five or more different staples of cotton grown and sold to one mill, and each one originated from different soils and under different climatic conditions. After careful study of them and their staples, I give the names of them. First we have the Russell big boll, which is coarse, heavy staple. Then the Cleveland big boll, which has coarse, large staple, Cook's improved early, with small staple in diameter, and short. There is also the half and half cotton, with which very few mills are not acquainted, with its fine production of motes and fly and other waste that it produces, King's improved early, is small staple in diameter, and short, Perry improved is medium length staple of large diameter. Bank account is a late cotton, with a tendency to be very uneven. It seems to be a mixture of several other staples brought out to compete with higher grades and high productive cotton.

Not being the farmer or the buyer, I could not overcome the staple proposition, but had to meet the conditions the best I could. We find the gin trouble, also, in uneven work. When we had the old time gin, the ginner was working to gin the cotton the best way he could. Now he is trying to see how many bales he can gin, not giving the manufacturer a thought. High gin speed means cut staple, more waste and uneven work for the superintendent and overseers to explain.

Pages could be written of things to prevent uneven yarn, before the cotton is opened at the mill.

Here is what I followed up, and

I got satisfactory results. After opening the cotton and selecting the nearest grades, keep at least one day's run ahead of the opener and mix well. Never allow, where you have an automatic feeder hopper to be over three-fourths full never let it run lower. So much is being said about high and low speed beaters that I will only say that it is folly to run them at the speed found in most old mills.

When looking for trouble from uneven weights, I look at the motes under the opener. Then I see if anything is affecting the air current. If I find that right I look after the feeder and see if there is any lost motion in the carrier or apron feed. If no trouble there then take lap from breaker and see if any thin places appear. Examine the mote box again and see if any staple is going in mote. If so I go to screens and see if they are all right. If I find no thin places in the lap, I weigh the whole lap and see if the weight is right. Never stop on weighing one. Then if I find they are right I go to the intermediate picker and go through it. If the weight of whole lap is right, weigh several yards, a yard at a time and if thin places appear, see that the eveners are working. Try several times. Look after the air, and see that the draft is right. The air draft should not be broken. Run evener belt, when steady, so that it will stand in center of the cone. That will give the evener opportunity to work either up or down.

**Cards.**

If laps are delivered to cards right and you find sliver from one card weight light and the next one heavy, and so on through the line, have the cards stripped and then time each one and weigh the strips and see if the cards are making the same amount of strips in the same time. If not set the stripper plates so they will. If you have uneven sliver, then look at the fly and see if each card is throwing out the same amount of fly. If not set the screens so they will. This all takes time and can not be done in one day. Sometimes you will find the delivery feed slightly varying in speed. When same make of card is in use the feed gears should all be the same. The can on front plays very important part. Never allow it to run so full that it will drag on coiler top. Read the thermometer at least four times per day, twice in forenoon and twice in afternoon, and see that it is near same. When stripping out be sure that the card fills up before putting up end. A few inches here on each card four times per day will affect the weight. Just a few inches of split lap on card with 90 draft will make several yards of uneven yarn when it goes through first and second drawing slubber and intermediate fine frame process.

The setting of cards would take pages to tell. Watch the sliver from doffer to delivery roll, as just a little from bad selvage here and a little there will make a vast difference. When you find one running with fiber splitting stop the end and weigh and see the variation in the sliver.

**Drawing Frame.**

The drawing frame is a very important process and has very little attention given. It should be given more attention. The knock-off should be in perfect order all the time, the machine should be kept clean. The flutes in steel rollers kept clean. The tension gear should be just right to take care of sliver when delivered. When leather rolls are used they should be varnished at least once every ten days. The trumpets should be carefully selected for the number grains of sliver running and never run a worn trumpet with the hole worn out of shape. If leather rolls are used see that they are the same size. Don't let can run full enough to ride on coiler top. See that your draft is right for the staple that is being run. For if you carry it through two processes of drawing with careless handling of cans, at coilers, and bad rollers, one will be drawn tight enough to break back every few minutes. Weigh it and you will find variation there.

**Fly Frames.**

At slubbers have cans so they will deliver to feed roll on slubber without any strain on sliver and see that each roller is of the same size in the back and the middle rolls the same diameter. The front rollers, some times after being recovered, and maybe new flannels put on and will affect the size of rollers, when one larger than the other, or smaller, as the case may

be, weigh the roving and see the difference. The tension on slubber plays a very important part and will affect the weight of roving. Never let the operator change the tension on slubber. A slight change in tension at the wrong time makes a great deal of difference in the weight. Keep the cones in perfect working order and the twist in slubber should only be enough to unwind it in creel of intermediate frame. Keep the carriage rail clean and the spindles well oiled, the frame lined and leveled.

The intermediate frame carriage should be kept clean, the spindles oiled and the cone belt in perfect condition, no chokes in traverse and the flyers all well balanced. Allow no lost motion in it. Pressers should be watched and see that there is not a worn one here and there to make uneven work. Too much stress cannot be laid on watching the rollers also, or the amount of the tension. Keep all the thin and uneven places out of the yarn by watching these little things.

The fine fames are on the same principle of the intermediate frames only a little more delicate. I would not say how often to line and level frames, for some floors settle more than others. They should be examined often and if necessary line them. A system of oiling is absolutely necessay, as dry rolls or shells will make uneven work.

Here I will say that any machine in perfect condition will produce perfect work, and to keep it in perfect condition it must be kept oiled and cleaned. Keep the spindles free from foreign matter, stands well oiled, skewers well pointed and the stands in place. Keep all the strain off of the roving. It is very delicate and the least strain will affects the weight and strength. Have all bobbins the same size and don't use a bobbin that is worn and loose on spindle or broken the least, for when it is put on the frame and the speed on it will expand in first few rounds to affect the roving for several yards of yarn.

**Spinning Frame.**

See that the creels are clean and the creel stands in perfect condition, that creel sticks have points on them, and that creels are level both below and above, so each stick will have the same friction and all work freely. See that all the trumpets are set and tight, that roving traverse gear is clean and working freely, spindle steps clean and the bases well oiled. Use no worn pointed spindles or any bobbins that don't fit on the spindle correctly. Have a system of oiling and see that it is carried out. Watch for dry shells or rollers as either will effect the yan. Watch for worn saddles; allow no waste to accumulate on spindles, see that each stand is clean and free. Never allow a roller to run on middle roll that is worn enough to gather waste on it. Notice that each shell or roller is the same diameter. Have the traverse builder gear so that it will lay the yarn side by side and not pile it one on another. Keep traveler cleaner on every ring if possible. Never use a ring that is worn in scollops.

This is written without giving drafts, but would have made the article too long, and each length of staple must have its own draft, and card setting to suit the grade cotton in use.

## Number Twenty-Five.

By J. M. JOLLY, College Park, Ga.

To my mind one of the most prolific causes of uneven yarn is that the overseers depend too much on the finisher picker. We sometimes get the idea that just so we have a good finisher hand and weigh his laps occasionally the work will be all right. Carelessness, we will say, is the biggest cause, but another great evil is the way cotton is graded from the warehouse to the opener room. If we have eight or ten different grades of cotton in the warehouse, as most mills have, the superintendent or overseer of carding should have the opportunity of going to the warehouse and selecting his cotton, a reasonable amount of bales of each different grade, so as to get the same grade for each days run.

Let us suppose we have our cotton in mixing room properly graded. Now the cotton must be mixed in

equal amounts from each bale, otherwise the trouble of grading is all in vain, and careless mixing is the same as bad grading. The beater blades must be kept in good shape and not allowed to run with a knife edge. We should have a perfectly smooth edge on beater blades and have the edge a little rounded. The knife edge will cut the fibre and cause a lot of uneven work throughout the mill. This breaker lap must be as light as possible, for the thinner the sheet, the cleaner the cotton, and the cleaner

**J. M. Jolly**
College Park, Ga.

the cotton, the more even yarn. Intermediate laps should be weighed twice a day at least. On the finisher picker we must at all times keep good spike beaters if we expect even work, and must not allow part of the cotton to reach the card improperly cleaned.

The object of the pickers is to clean and lap the cotton. The work of the grid bars and dampers must be looked after closely if we expect to clean the cotton, and if we expect even work, we must clean the cotton. If we clean the cotton in the picker room this week, and half clean it next week, we need not expect even yarn. We must keep everlastingly at it.

Well, we are up to the card with a good even finished lap, here we must have all cards properly set. Have grinders carry with them a good whisk broom and thoroughly brush every screen after grinding the card, so that all foreign substance will fall away from the card, instead of going to the stock. This will help make clean work, and to my mind, the cleaner the more even.

We all know that draft gears slipping will cause uneven work. We all should know that if the wooden lap roll on the back of the card skips teeth, the feed roll will pull thin places in the lap and make uneven work. I examine the draft gears on my cards at least once a week and if the draft gear, feed roll gear or lap roll is slipping I will find it. If the numbers come up wrong, which they sometimes do I will find it. These are some of the little things that make the big ones. We must watch close after the doffer comb blades and make sure that a part of the web does not get on the floor, for we need it all in the can if we expect even work. Make sure that the calender roll on the card is properly speeded. Do not have mixed gears scattered throughout the room at this particular place and have certain cards pulling the web away from the doffer too fast. If you do it will make uneven work. Teach the card hands to notify card grinders the first time they have a card to make a singling on account of a bad doffer blade. The card ought not to go to the card grinder the second time, but report it to the overseer. Flat stripper blades must have the same care. Card stripping running back through the work on account of bad blades or from any other cause will make uneven yarn.

We are now up to the drawing with even work. Set the spoons on back of drawing so they will knock off even for singling coming from the cards. Inspect cards daily to take out all singling. Arrange cans back of draw frames so that drawing hands can walk close to the frame to put in ends, for if we allow them to stand back the depth of 4 cans and throw sliver up on other sliver, and start the frame with the other hand it will be impossible to get work through the drawing even. Keep weights adjusted so that the rolls will have the proper amount of weight, for the least bit of variation from too much weight or lack of proper oiling, will cause much variation in

drawing, which will make yards more later. If you do not think the drawing question is mighty important, and lots of uneven work is caused there, experiment a little and have the second hands and fixers spend an hour or so adjusting the weights. Get every end in drawing sections running in ribbon form.

Drawing frame rolls should be cleaned at least every 10 days, or better every 6 days. If you expect even work keep chokes off drawing frame rolls and oil them well. I weigh drawing twice a day, once before noon and once after. If I find more than 2 grains variation per yard, I look for the cause. At best our roving and yarn has some variation but I bear in mind to watch the drawing if I expect even work.

In cleaning drawing rolls, we use the cheapest labor we have, usually in charge of a card grinder or section man, and the saddles are all mixed up and when the cleaning is over, the numbers on drawing are worse than they were before cleaning.

The slubbers, intermediates and speeders all work practically alike except creeling, my, my, the uneven work speeder hands will make creeling, if you do not watch them. Watch creeling closely the tentions on all fly frames have a lot to do with even or uneven work.

The lack of oil on back or middle rolls will make uneven work. Take shells off of arbors at least every 2 weeks and wipe arbors clean with card strips. and put on plenty of fresh oil. Have this done on Saturday at closing time and do not allow some of the frame hands to say, "I did that yesterday". If it is all done at a specified time, it will help make even yarn. The use of worn shells will cause uneven work. One newly covered and one old shell on same arbor will cause unevenness. Keep shell rolls locked up and keep a pair of calipers in cupboard. Let second hand caliper and pair all shells as they are given to the frame hands. This will help make even work. Don't put a new shell on arbor without first putting on fresh oil. Hard driven spindles from lack of oil cause lots of uneven work, as will one wrap too much or one wrap too little on presser. Uneven work is also caused from a lack of knowledge as to what temperature is needed. I prefer to have humidity regulated separately so as to have it even in card room without speeders. Humidity and temperature have quite a lot to do with uneven work.

Double lapping cards where laps are running out is as bad a thing as I know of. Do not allow card hands in laying laps, to lap them 3 or 4 inches as they put them under feed rolls. Inches bad in the card room make yards further on.

Before we leave the card room let's drop back to the grading and mixing in warehouse. We have cotton graded from 3s to 9s. We consume about 24 bales daily, more or less. We run today on 3s and the next day on 9s, the following day on 5s and so on. We cannot produce even yarn out of this. Why not take so many bales of each grade for each day's run and have a proper mixing and better numbers? This is why I say poor mixing is causing a lot of variation.

Now, we go to the spinning room. A lot of spinners say that if they get good work, they make good work, but if they get bad work, they cannot make it good. I am aware of the fact that the card room is the place to start it even. There are causes for uneven work in spinning as well as in carding. Here are some of the things that will make big ones. Cotton wound around flutes of steel rolls will cause variation in yarn. One large shell and one small one running on same arbor will make uneven work. These shells should be calipered as they are given to spinners to put on sides. Teach spinners the importance of oiling before running new rolls. Overseers will say that the rolls come from the shop ready paired and marked. Probably they do, but do they reach the sides that way? Keep shells locked and have second hand caliper every pair that goes out. Keep shell arbors oiled throughout the spinning room, for if they run dry it will cause uneven work. Watch closely after the travelers. If you are running more than one number of yarn, do not let travelers get mixed on the frame. Unusually heavy travelers scattered around here and there through the spinning room will pull the life out of the yarn and make it weigh wrong. Bad roving skewers in speeders or spinning frames will cause the same trouble. Make sure that cap bars are all spaced alike. One end of the roll a sixteenth of an inch out of line will

make a lot of uneven yarn. Keep spinning rolls well cleaned and back saddles well oiled. Have lever screws adjusted so that all levers will be about 1 1-2 inches from creel board at back end of lever. Watch close after the roving traverse and keep it working freely at all times. Teach spinners to watch out for chokes in roving guides, for they will weaken the roving and cause uneven yarns.

Overseers should take a sizing from each different yarn and roving twice each day. Make sure that the reels and scales are in the proper shape. Do not try to weigh roving or yarn in a current of air. Be careful about this little job, it is important. Do not be too quick to change. Be sure you are right before having changing done. Get right and then have it done. Otherwise, you will have variation. Do all the changing, if possible, in the card room to keep numbers. Do not change draft unless you are compelled to do so. Give spinning a 9-inch draft, if possible. The shorter the draft, the better the breaking strength and the evenness of the yarn.

## Number Twenty-Six.

By T. L. SAUNDERS, JR., Morganton, N. C.

I will try and write an article on "Cause and Prevention of Uneven Yarn." First we will start in the warehouse and select the different grades of cotton, good middling, strict middling, middling and tinges, that is, if we use all of the above grades. However, take your mixing

**T. L. Saunders, Jr.**
Morganton, N. C.

in and lay the bales side by side. Get the opener man to use a large box on wheels. Take cotton off each bale, if you can use fifty bales, so much the better. So you see you will have all the bales, no matter what numbers may be going through the mill at the same time. I find this a much better mixing than the old way. The man who feeds the hopper can run along beside each bale and get the same amount from each one. There can be 2 or more boxes used, according to the space. Keep the bale breaker or hopper two-thirds or more full, and be sure that this is strictly carried out and you will get good results. Keep the inside of the machine clean and free from friction. Keep screens clean and draft ways clear. See that the draft is distributing equally and use the lap split preventer. Be sure to oil every part well. Do not let the laps run out together, and keep them from splitting. Run the evener belt two-thirds above center and in case one lap should run out, or a lap split, the evener will take charge of it,

It is a good idea to weigh breaker laps several times a day, as well as the intermediate laps, to keep them even. Be sure to weigh the finisher laps, every one. Have the finisher man to set them down and keep a record. It will be a caution to the operator. Do not let the finisher laps vary over one-quarter pound each way. If they vary more, run them over. If the above is properly carried out, the cards will receive good work.

Cards should be closely watched by all from the overseer down. If card hands are allowed to be negligent and the card chokes up and jams the doffer, the result is that the mashed places can never be as smooth as before, so the web will be uneven. Set the feed plates to a

number 12 gauge; mote knives 7 to 12; screen to cylinder front to 4 leaf gauge, and back to cylinder 22 gauge; back plate lower edge 17, upper edge 12; front stripper plate, upper edge 17, lower edge 12 gauge. Of course you must use your good judgment to meet all good and bad conditions, and vary the above where necessary. The cards must be ground sharp and kept that way. If the above is carried out, you will have an even sliver to the first drawing. The card draft should be 90 to 100. I prefer 100. I do not recommend over 15 turns per minute for 27 inch doffer. Run less, if it can be done. There are more yarns caused to vary from excessive speed than anything else. Do not let the cans run too full. If too full, they will injure and stretch the sliver and of course it will be uneven. Keep the card well oiled, but avoid excessive oil. Be sure not to get oil on the clothing for it will injure the fillet and make it soft. The result will be bad and uneven carding.

I recommend a draft of 6 on both processes of drawing, not over the above. The drawing frame is neglected by some men, but all of us who are up on our jobs know that the drawing frame must have the same attention that every process should have. Set the first and second rolls as close as you can on 7-8 to 1 inch staple, second and third, 3-16 third and fourth rolls, 5-16. 3-16 and 5-16 over staple length. This applies to metallic rolls. The leather rolls should exceed this slightly. The metallic rolls must be looked after very closely. Keep them clean, using a stiff brush, or a worn-out whisk broom cut off evenly. All of the weights must be closely set to be kept on, otherwise the sliver will be light and heavy. I have seen the overseers run the sliver slack from the front roll to the calender roll and not know how to remedy it, the sliver sagging and running in lumpy. When this is the case, tighten the sliver by changing the compensating gear. You can tell when it is too tight by holding a pencil under the sliver. I much prefer tight ends to slack ends. When they are nice and smooth, the work is much more even, so the cleaning and oiling must be well done.

The stop-motions must be closely watched. I recommend a small strip of wood 1-2 inch thick, bolted on the casing, just over the sliver spoons to hold them as close as possible to the knock-off motion, so when the ends run out they will stop quickly. I am using this and it eliminates 50 per cent of the ends from running in too close, or all the way. Be sure and have drawing tender put the ends as close to each other as possible and see that they piece up a nice smooth splice. The cans must not run too full. If the cleaning and oiling and all of the adjustments are looked after there will be good even sliver to run to the slubbers.

I recommend a draft of 3.85 on slubbers. With this, and standard twist ,proper lay and tension, rolls set to suit the staple, an even slubber roving will be produced. The oiling and cleaning must be done if the laps are kept the correct weight. I do all my changing, that is heavy up or lighten up on slubbers. changing the crown gear will only make a slight difference. Otherwise, if you change laps or drawing or speeder, as there are doublings, it makes too great a difference, so it will overdo it one way or the other. The slubber has no doubling, so you see the change will not be so great. See that slubbers and speeders have all presser fingers wrapped the same, for otherwise there will be bad and uneven roving. See that the operatives do not use cotton under the top clearers to hold friction on the roving that is smaller than the other, but take the bobbin off if they do not. Very often they will leave the cotton under the clearers and make stretched roving. It is important to keep a close watch over the temperature and as the weather affects the roving, keep close after this. A good overseer who takes an interest in all of the above will be sure to have good even roving for the spinner. In regard to twist in the roving. I have recommended standard on slubbers for 7-8 to 1 inch cotton. The twist on intermediates and speeders should be 1 or 2 teeth above standard and on roving frames. 2 or 3 teeth above standard on 12s to 20s yarn. and on 20s to 30s, 3 to 5 teeth. So the twist is very important and the roving must have plenty of twist for short cotton. There has been, and is now, many a mill that lost thousands of dollars by this one thing. There are many more things

which could be mentioned, but lack of space prevents.

So if the spinning receives the roving in good condition, it is a very easy matter to produce good, even yarn. The spinning must be kept clean, rolls clean and well oiled and set so they will not rub. Steel rolls should be well cleaned. The top rolls must be as near the same size on each cot as possible. The overseer should see that the rolls are put in the right way, and teach the help to do so. The stirrups must be adjusted, the levers all set even, the bands all uniform and tied in with as near the same tension as possible. The bolsters must be oiled well with good light oil, and spindles plumb, rings set true, and guide wires set true and every thing nice and properly adjusted. The roving must be kept clean, skewers kept sharp so as to pull freely. The skewers sets must all be in place. The spinners must be taught to piece up the ends smoothly and to avoid fanning off machinery all through the mill. If all of the above things are done, you will have nice smooth even yarn, providing you have the proper draft. I recommen, on single roving, a draft of 7, not exceeding 8, and on double roving a draft of 10, not exceeding 12. In regard to speed, do not have excessive speed, as high speed is detrimental and will cause bad uneven work. I fear I have overstepped the limit, but hope my ideas will help some one.

## Number Twenty-Seven.

By John CURWEN, Macon, Ga.

**John Curwen**
Macon, Ga.

In dealing with variations of yarns, one comes across so many things that tend to produce said variations, that it becomes rather a difficult proposition, what to introduce and what to omit as actual or predisposing causes of irregularity. The foundation for an even, smooth and round thread, is laid in the mixing room. Presuming that there will be two separate mixings—warp and filling, it will be necessary to make each mixing from the various "Lots" of cotton, with due regard to the quality and length of staple so as to get the mixing as uniform as possible. In every mixing when the old "lots" are running out and new ones being substituted, the greatest care should be exercised in the selection of the new stock. When waste is added to the mixing, it will be very necessary to see that it is evenly distributed for an excessive amount of waste in one place is liable to cause annoyance in working and produce bad results. By following out this idea, where possible, the erratic wandering of numbers, sometimes so troublesome, is modified and occasionally removed.

Having satisfactorily arranged the mixing, let us pass on to the pickers. Much has been said and written about the importance of the pickers, yet I question whether it is yet fully understood how very serious a factor in the production of good work the picker room is when intelligently and conscientiously run. The breaker laps should be weighed by the yard twice each day. The spiked apron should never be allowed to slip, the hopper should be fed evenly; should never get too low nor yet too full. Irregular laps result from crowding the hopper

and allowing it to run with too little cotton in it. The calendar rolls, pedals and feed rolls of finisher lapper should be kept well cleaned and oiled, with entire freedom of action of its working parts. When placing full laps upon the apron of finisher or intermediate lapper, avoid replacing more than two at a time, much better one at a time and let them be graduated from a small piece to a full lap, this prevents overweighing of apron lessening the possibility of its slipping and making thin places in lap. It also does away with the liability of laps licking as is the case when four full laps are crowded together at one creeling. The fan flues should be kept clean and the dampers set in such a manner that the fan will carry the cotton from the breaker to screens in an even sheet. Intermitent dwelling between beater and screens produces thick and thin places in lap. Cone belts should be kept free from grease, lint and dirt and at the proper tension. Occasional weighing of finished laps by the yard and full lap ought to be attended to daily, by overseer or second hand. This latter proceeding helps to keep the man in charge of picker room in line with his work. A trustworthy man in the picker room is an urgent necessity.

The draft gears on all the cards should be overhauled once in a while to see that the right gears are in use. All cards working similar stock should have the same settings. In other words all cards working the same kind of cotton, ought to make approximately the same amount of waste in strips and fly. Doffer combs ought to be kept clean and free from oil at the ends, otherwise lint will gather there and interfere with the passage of the web to the delivery rolls, and single will be made which is not always seen at the draw frame. Of course, cards must be kept in good working condition.

The draw frame is under certain conditions a prolific source of uneven yarn. If the sliver spoons are not kept clean and well balanced, uneven work will result. Indeed, this is the weakest spot in a draw frame. A careless attendant will spoil work on this machine, making single, double and lumpy yarn. He (or she) will throw an end over and start up the machine, hold the belt on the tight pulley until the end is caught by the roll, when the spoon resumes its position and the frame runs on. A lump, and perhaps some yards of single have resulted from the piecing of that end. Just imagine what havoc can be done to the material by only one such careless or indifferent attendant. All ends should be pieced up to the rolls in a neat manner by the fingers and thumb. The rolls should be kept free from laps, clean and well oiled. Make a periodical examination of weight hooks and weights to see that they are in proper position. In draw frames with top leather rolls, no bad rolls should be allowed to run. A leather roll that is channeled, hollow or a loose cot will draw the sliver irregularly and show up in uneven yarn.

Speeders under certain conditions are productive of uneven yarn. Oiling and cleaning of rolls on speeder is of the utmost importance when best results are aimed at. The observations above as regards the leather rolls on the draw frame apply equally to all leather top rolls in carding and spinning. Whilst it is necessary to keep all top rolls cleaned and oiled, particular attention must be paid to the front top roll, as any carelessness here will show up most prominently and detrimentally in the finished yarn. Any retardation of front roll owing to an accumulation of lint or lack of oil, will produce yarn coarser than the machine is calculated to make and a few of these on each machine will certainly bring trouble. The top rolls should be inspected to see that they are set straight and parallel to each other, as they sometimes get out of line and bind, which interferes with the proper drawing of the sliver. All speeders working same hank from one kind of stock, ought to have gears exactly alike, such as draft, twist, lay and tension gears. If upon a careful overhauling of same, such is found not to be the case, then the reason for such a condition ought to be immediately ascertained and the correct adjustment made. The winding arrangement of speeders is a very important point and should be looked after in an efficient manner. The ends after doffing, should take up without any stretching or sagging and should continue to so wind throughout the whole set. If there is any difficulty, outside of the tension gear, in obtaining this result, name-

ly, uniform winding throughout the set, examine the cone drums, see if they are parallel to each other and quite plumb at the ends. On many occasions I have found the cones out of position. Sometimes the correct lay gear is not being used. Never allow speeder hands to run the frame or speeder after it has knocked off from doffing. On some makes of frames, before the speeder hand can run his machine after knocking off, he must wind up the rack a few teeth, and the roving afterwards put on the bobbin is stretched out of all reason and many times a lot of tangled bobbins are made. Do not make the bobbins too large for the flyer. The flyer ought to be well balanced taking care that the pressers work freely and to full distance when bobbin is full. The ends should be wrapped the same number of times around each presser finger. All empty bobbins should be of same diameter. It sometimes happens that a speeder hand in creeling will leave a long end when creeling a new bobbin and continue so doing all the time he is creeling. This is a very reprehensible practice and very inimical to good work. Blunt creel pegs should be dispensed with and creels lined up to remove sagging of creel rails.

What has been said above concerning top rolls, creels and creeling, applies also to the spinning room and need not be repeated.

All roll weights and saddles must be well looked after in order to see that they are in proper position and the weights are really resting on the rolls. The guide rods of creels should not be too high as this produes too keen an angle and is liable to stretch the roving or even occasionally to break it. The roving guides must be kept clean and no dwelling of guide at the end when heart motion changes. Accumulation of roving on creels, when some of it is left there for indefinite periods, is a bad practice because the first few layers on the old bobbins are frequently soft and oozy and lighter than the balance of the roving, in fact all roving should be used up before laying up fresh bobbins. Worn rings and travelers are inimical to good work. Cleaning, oiling and carefulness in the performance of duties are also of supreme importance in the spinning room. I have, I believe, reached the limits prescribed by the rules of this contest, and whilst I am aware that I have not, by any means, said the last word on this very interesting and important subject, yet I have tried to confine myself to those matters that **really do count**, in the making of even yarn.

## Number Twenty-Eight.

By J. R. MANLY, Williamston, S. C.

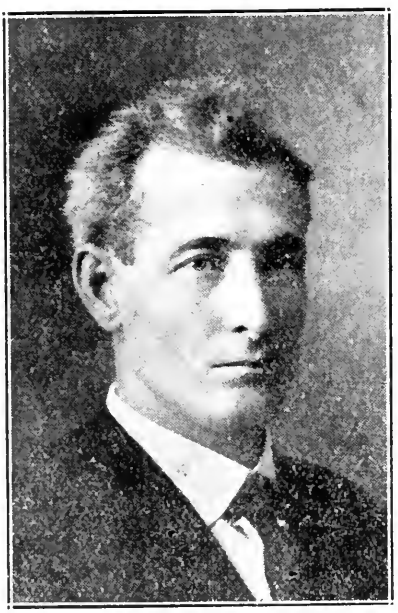
Please allow me space in your valuable paper to say a few words for your December contest, on cause and prevention of uneven yarn.

Even numbers can only be kept correctly by starting the cotton right in the opening room. It is very important that the cotton is carefully graded and mixed, by opening 10 to 12 bales, taking a layer from each bale and blending it together. All cotton, because it is pretty and white, is not good cotton, we have premature, mildewed, gin-cut and frost-bitten cotton and numbers of other bad things, therefore it is very important to grade and blend it to get even numbers and have a close average. We must not use dry cotton today and wet cotton tomorrow. It is very important to have room enough to keep at least one day's run ahead, that is, open the cotton today that is to be used tomorrow. This will give it a chance to dry out in case it is too damp when first opened. All reworked waste should never be mixed in the regular mixing, because the pins on the incline aprons separate the waste from the cotton, allowing it to pass from one machine to another in streaks, causing weak and uneven yarn.

Take your waste with an equal portion of cotton (enough to keep the laps from falling apart) and run it through the opener and breaker. Then use one waste lap to three cotton laps on your intermediate apron. This is the only way to mix waste for perfect results.

Keep the automatic feeder as near the same fullness as possible,

say three-fourths full, so your breaker laps will be even in weight per yard. Unproportioned speed of pickers a great many times is the cause of uneven work. Low speed of fan and insufficient suction to hold cotton on screen will give you a lap full of thick and thin places with different weights per yard; which will make variation in numbers throughout the mill. A high speed beater will create a draft; if your beater draft is stronger than your fan draft it will blow the cotton off the screen, causing lumps. This can be remedied to a certain



**J. R. Manly**
Williamston, S. C.

extent, provided the eveners are kept in first-class working shape. If they are not they can't respond to a delicate change in the weight of the incoming feed. The result is that you have variable sliver.

All evener cones should be lagged or corked, which insures no slipping of evener belts. No matter what weight per yard the laps are to be, the evener belt should be made to run in the center of the cone which gives an equal adjustment for either heavy or light feed and it keeps down variation from slippage. If your cone is not lagged or corked it will occasionally slip on the small end, especially if the cones are oily or tight in the bearings. Every time your evener belt or apron slips it will cause light streaks in the laps, which will cause light streaks in sliver. I would recommend that all aprons on pickers be pulled with sprocket chains, which insures no slipping and prolongs the use of aprons.

The card has a long draft and one inch of uneven lap makes about 100 inches of uneven sliver. Thin places in your laps are jerked in by the licker-in and placed on the cylinder in lump shape, causing uneven work. Doffer combs too high and cans run too full will cause stretched sliver, laps split and run into the cord double will cause uneven work. Have card tender to fix lap and remove doublings. A careless card tender can damage the sliver by letting heavy and light work go by him, this is done during the time the cards are starting up after stripping, as he pieces up the end before the card has time to fill up. The result is that a large portion of the sliver is too light.

A lot of light and heavy work is made at the drawing frame on account of a careless drawing tender lapping his piecings too long, or by running the frame with one or more ends out at the back. This should not be tolerated and if he is trained and watched he will get his piecings very near perfect. Stop-motions too slow to respond, letting singlings through the rolls and ends running out at back will cause uneven numbers. I find it is a good rule to look over your drawing stop-motions and examine your ends 3 or 4 times per day, as one can of too light or heavy drawing sliver will make several bobbins of uneven yarn. Dry rolls clogged with cotton, rolls badly worn or not properly weighted, too much weight on one end and not enough on the other will make sliver variation.

The trumpets should have the proper bore for standard weight of sliver and the proper draft between the front steel roll and calender roll. The trumpet bore should be small enough to condense the sliver to make it smooth and strong enough to pull itself. The draft between the front steel roll and calender should be just enough to make the end sag the least bit. If the bore of the trumpet is too large, or the draft too great at the calender roll, you will get stretched

and uneven sliver. I find that keeping the numbers at the drawing frame is the best place. If the drawing sliver is weighed 4 times per day light or heavy streaks can be detected and remedied before it gets mixed all through the roving and spinning frame, where no gear can get it right. If light work gets mixed with heavy work in frames and you make a change that will effect the light work it will make the heavy work too heavy. While your average number may come right you will have a great variation.

Good rolls are absolutely necessary on fly frames if we get an even roving. They should be oiled and cleaned regularly or they will run sluggish and make stretched and uneven roving.

Special attention should be paid to the tension at all times. This is another place where a lot of bad work is made that causes variation in roving and yarn. The overseer should see that the tension gears are locked up and in charge of the section man allowing no one else to change them, holding him responsible. If this is not done some time the wrong gear is put on, making the ends run too tight or too slack, depending on whether the gear is too large or small. The result will be stretched roving when it is too tight, and when it is too slack the frame tender will wind up the tension a tooth, not only taking up the slack but for a time making the ends run too tight, making stretched and irregular work in after process. If it is necessary to change a gear on a certain hank or grade of work the whole of the frames on this class of work should be changed. In changing gears, no gears should be changed without the consent of the overseer. All changes after being made should be reported to him.

I find it is best to run the ends with the least bit of sag, by running them this way and keeping a good supply of different size tension gears you will cut out stretched and uneven roving caused by the wrong tension. Worn and blunt skewers will stretch roving and cause uneven yarn.

Good roving can be damaged at the spinning frame causing unevenness and variation. Worn and blunt skewers, bad rolls, dry rolls, rolls not cleaned regularly, slack bands, bad travelers, too heavy a traveler will cause weak and uneven yarn. Too much draft, rollers spread too wide apart, that is, the distance from bite to bite, the distance from where the steel and leather middle rollers release the fibre to where it comes in contct with the steel and leather front rolls, will cause thick and thin places in yarn. If the above suggestions are carried out there should be little trouble with uneven yarn.

## Number Twenty-Nine.

By J. H. MAYES, JR., Fitzgerald, Ga.

To eliminate uneven yarn is the goal to which all successful manufacturers aim. The foundation of good yarn is the opening room and a great many of the causes of uneven yarn can be traced to careless mixing ahead of even grade and today enough cotton together with the day's waste to run the openers tomorrow, which will allow a day's miving ahead of even grade and staple and discourage operators feeding off bales without mixing them together and filling openers full of chunks. Machinery builders recognize the importance of these defects and have made wonderful improvements by inventing bale breakers and automaticly feeding openers. Selecting a careful man to feed the openers will go a long way towards good results as carelessness in handling buckles allowing stain cotton around ties to get into the cotton, small pieces of jute bagging to get into the hoppers all tend to injure the machinery which, of course causes uneven laps.

To make an even lap care should be taken to keep lappers properly oiled and cleaned, especially on the inside, excessive beater speeds effect the air currents and permits uneven layers of cotton on the screens, excessive fan speeds draw impurities that should pass through the beater grids over to the screens. To get good results from the eveners, draft machines so that the evener belt runs in the middle of

the cones which will enable the evener belts to traverse freely both ways when necessary, always stop machines to clean trunks, grid and mote boxes, because cleaned impurities while machines are running effect air currents and naturally cause uneven laps. Some carders have certain times to do this cleaning, the best way is to remove these impurities when deposit chambers are two-thirds full to eliminate the danger of waste going into the finished laps. Train picker tenders to make good piecing and not to allow laps on aprons to run out, thinking eveners will do their work for them, also keep different sizes of laps on aprons to prevent laps running out together. Each picker to do good work should be thoroughly overhauled each month to keep screens free from chokes, gears and eveners in good working order. All belts should be cemented on pickers, especially beater and evener belts, to get even speeds, aprons in good repair, neither too slack or too tight. Nothing ruins evenness of laps more than split laps, and are caused mostly by poor mixings, lack of cleanliness or wrong setting of draft dampers by looking carefully after these items there isn't much danger of unevenness from split laps. A few minutes spent daily in picker room seeing that these points are carried out should deliver good laps.

**Cards.**

To produce even sliver cards must be well ground, accurately adjusted, stripping plates set to remove same percentage of strips, top flats kept clean and fillet taken care of, careless oiling of cone boxes allowing oil to get on edges of doffer and cylinder fillet causes uneven, rough selvages. The duties of a grinder are not only to set grinder rolls on cylinders and flats but to thoroughly examine every part, see flllet isn't injured, gears kept clean. See flys from under cylinder screens are all taken out and not pushed into the corners, taking pains to guage all settings accurately. Air currents must be kept out of cards for they play havoc with good carding. Operators must be taught the value of good piecing, both at lap and coiler boxes and the necessity of the filing up of cylinder and doffers after stripping before allowing sliver to enter cans. Careless piecings speak for themselves. Strip card whenever doffers are getting specky and discourage carding more than 175 pounds per card per day. Cleanliness on cards is very important to keep flying out of sliver.

Drawing, because a simple process, is often neglected, but requires close attention and a careful operator. The top rolls should be kept running with the lap, free from ridges, kept well varnished, evenly weighted, hooks hung clear of steel rolls, trumpets reamed to condense sliver on all delivery alike, steel roll scoured every second week, stop motions kept in good working order, oil put in oil holes and not allowed to run onto rolls and under coiler gears. Top clearers kept in good shape and kept clean, so as to prevent clearer waste dropping between rolls and going into the sliver or breaking the end at trumpet, causing piecings. All bad work should be shown to whoever makes it, to impress on their minds you are watching quality. Weighing each delivery several times daily gives a good check on evenness, being made also enable overseer to keep weights correct.

**Slubber, Intermediate and Speeders.**

Condition roving frames are kept in has a great deal to do with even roving, frames with tight spindle, uneven wraps and pressers, gears not mashed right, unlevel carriages, careless oiling, bent flyers, worn spindles, wrong cone and tension gears, changing and taper motions, binding causing poorly built bobbins, clearers worn and not properly kept up, poor leather rollers uneven weighing by saddles not being properly adjusted, skewers in poor condition, negligent cleaning, allowing hands to put excessive twist while putting up ends, allowing singlings to run, or in creeling allowing three ends to run causing doublings, taking up or letting off on cone belt make it mighty discouraging for a spinner striving to produce even yarn and lots of it can be stopped by either fining or discharging whoever makes it.

**Spinning.**

Run double roving if possible, with as low draft as card room will permit. Cleanliness is very necessary, and careful section hands to keep rings, guides, creel steps, skewers and travelers changed when worn. Steel roll should be kept clean, not only under leather rolls, but aside of stands, top rolls kept well lubricat-

ed, bolster casing filled with oil, bands examined daily while frames are being doffed, doffers should be made to doff and piece-up their own ends to make them careful about breaking down ends, teach spinners to twist up their ends to keep slugs out of yarn. To be a good spinner doesn't mean how many sides they cover but are they making even piecings, twisting up ends and neatness in general. Weigh scavenger roll waste of each spinner daily and encourage rivalry as to who make the least, for reworked waste causes unevenness. Return all singlings and doubling back to card room to enable the carder to know what is going on.

A good manager of help is necessary to obtain good results for good yarn and efficiency go hand in hand, a man operating a machine, seeing you are determined to have the work for him properly prepared will naturally take interest in what he is doing and when all appreciate good work means less work, everybody gets in line.

Overhead brushing down should be done when mill is stopped and frames covered with burlap kept for this purpose. Hangers and electris lights wiped, not brushed, to protect roving from slugs.

A good humidifying system is a necessity for quality. A mill that is properly equipped to regulate humidity that can keep windows shut has a tremendous advantage over a mill that is not, for nothing you can do in a spinning room does more harm than wind blowing lint from finger-board and overhead into the yarn.

Usually drafts and speeds are beyond our control, owing to layout of plant, but beware of long drafts, unevenness and high speeds and breakage caused by piecing.

## Number Thirty.

By W. E. WILLIAMS, Louisville, Ky.

If I understand the true meaning of unevenness when applied to yarns, it is that the yarn contains thick and thin places, because, if we have a yarn of different diameter we would say that our yarn was varying, or that is, we would, (as we say in the mill), not be keeping our numbers, therefore, we are not to discuss that part of yarn manufacturing in this article. It is also desirable that we try to bring out something new, it is in the writer's opinion one of the most (if not the most) difficult problem that the mill men have to contend with yet, if every man would keep his eyes open and see what he sees, and not go as if he were blind, some of the mills that are going bankrupt more and more every day for no other cause than the making bad or uneven yarn, then, that same mill would put on a paying basis.

In this contest it is also undesirable to write something that the other fellow has at some previous time, therefore, it looks almost useless to the writer to make an effort, however, I will write just what I have in mind and place about seventy-five per cent of all the uneven yarn that is made at any mill right up to four causes, viz., bad or irregular cotton, bad settings of gears, tention on fly frames, and bad rolls. The importance of having cotton all the same grade at all times, cannot be impressed too strongly upon the buyer of cotton at each plant. If you buy, say 100 bales of cotton, say 1 1-8 in, then say that the next 100 bales is 7-8 inch, and then the next 100 bales is 1 inch staple, do you think that your superintendent can make even yarn out of it? No, I will answer that question. In reference to the above I should have said that this cotton is run at different times, as is the case in more than one mill throughout the South, therefore it is the writer's opinion that in several mills the buyer of cotton is responsible for the uneven yarn made.

Assuming that we have good cotton the next point is to get a good lap, and in order to do this is is absolutely essential that the pickers be kept in a number-one condition, much could be said in regard to settings, fan speeds, etc., here, as well as at others throughout the mill. The writer will not take up settings and speeds in this article because in his opinion you could not give any set of rules that would apply to the diffierent mills, therefore will take it for granted that the overseer should know just what settings

and speeds would suit his mill best.

In my experience in the mill I have found that it is a very good idea to have laps from intermediate pickers weighted, because by so doing you can get evener laps from the finisher picker, you relieve your evener motion on the finisher by keeping your laps even on the intermediate, thereby giving your evener on the finisher picker chance to make good any excess of cotton caused by the picker hand lapping over five ends on the apron in place of four. The evener should be regulated so it would make a finished lap from three, four or five laps weigh the same; that is, if you are feeding in four laps on the apron of your picker, if for any cause one lap should stop feeding or be taken off the apron, your evener should make your finished lap just as if nothing had happened. Assuming that we have a good even lap, we now come to the card. It is also very important that this machine be up to a high state of efficiency as much depends on the card for even yarn. The man that has a card making a bad or uneven sliver and expects to remedy it at a later process, makes me think of the man that rewinds a cone because it has oil on the end of it, to get the oil out, he may hide it but it still remains there. In the writer's opinion there is no way of making good even yarn out of uneven or cut sliver, whether it comes from the cards or drawing frames. The above would also apply to fly frames making cut or uneven roving. Again assuming that we have a good even sliver from the card we then come to the drawing frame, which is the cause of no little trouble when the uneven yarn question comes up, there are several reasons why the drawing frame makes uneven yarn, such as speed being too high, but the most common of all is draft gears not being set right—bum second or section men. Most overseers do not watch the men under them close enough, thereby letting the mill get stocked up on uneven work before it is noticed. It does not matter how good the man is under the overseer ,he—the overseer—should keep his eyes on what he is doing; that's what the overseers are paid for; it is as I have said before, he should see what he sees, not shut his eyes to any thing that happens in the mill. Many times, however, he sees something going wrong where it takes good judgment—horse sense—to straighten out satisfactorily.

In regard to the drawing frame we will again mention a few things that, although it looks useless to mention such points as bad rolls, waste lapping around rolls, keeping weight on rolls, flutes getting clogged with dirt, etc. The writer thinks that the man that runs a mill and does not see such things as those mentioned above would do better to be out on the farm raising cotton, rather than trying to spin it, and that would also apply to the remainder of the mill as well as the drawing frame.

We cannot impress too strongly the importance of keeping your eyes open and seeing what you are doing, don't sit around until the customer complains before you find that you are making uneven yarn, if you do you will have several hundred or possibly several thousand pounds already made before you find that you have even made any at all.

We next come to the slubbers. Much could be said in regard to stretching of sliver. Too much tention, bad rolls, flyers in bad condition, laps on rolls and possibly a hundred other little things that will always have to be considered in the manufacture of yarns, that any good section man would know all about, if, as I said several times before in this article, he would only see—look to find. It is not that most men that have charge of mills do not know what causes bad or uneven yarn, it is that there are too many that are careless and indifferent. If, as I have said before, 75 per cent of the uneven yarns that are made in the mills, could be traced to the four causes of bad cotton, settings of gears, tention on fly frames. and bad rolls, then if the men in charge would only keep their eyes open and see, they could make the other 25 per cent even yarn look like 30 cents with a big hole in it.

What I have said in regard to the slubber would, for all practical men, be sufficient for all fly frames, as there is very little difference except in the creel.

We then come to spinning machine. I say machine because the word spinning would apply to the mule as well as the ring frame. We could hardly say any thing in regard to the spinning frame or that is the ring frame, except something that

has already been said, such as bad rolls, rolls not set right, gears not set properly and in general such things as should be known by all section men or at least second hands. The same would also apply to the mule, the mule could make uneven yarn out of good, even roving, just as could the ring frame, only in little different ways. The mule generally makes more cut or uneven yarn than the ring frame if your mule spinner is not a number-one man. The mule makes bad yarn by the ends being run too tight by the spinner, too much carriage draft, fallows not being level and in line, the frame itself being out of level or line, carriage being out of square, jack bands being too slack, and all other causes that the ring frame would apply to the mule.

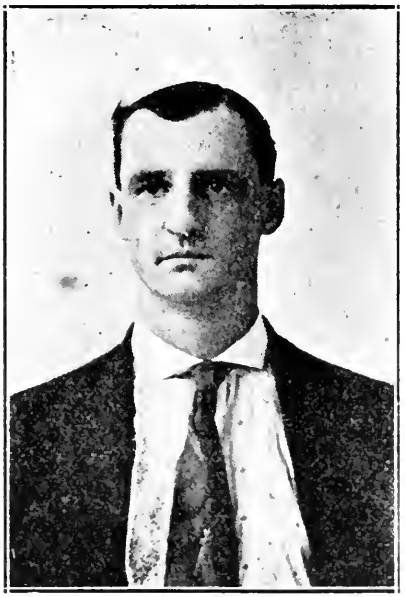
We could go on and write several hours, or possibly days on those little things, but as I have said before, the overseer that does not see these little things that we could mention, should be out on the farm raising the cotton for some one else to spin.

In conclusion I will again say if you cannt see things when you go through your mill you had better resign or go and have your eyes examined, so they can **see what they see.**

## Number Thirty-One.

By B. M. BOWEN, West Durham, N. C.

In order to produce an even yarn there are a great many things that are essential, cotton of a good grade should be well mixed and should be opened some time before it is used in order that it might have a chance to loosen up. The hoppers should be kept well filled and about the same amount in them all the time, so that an even and uniform lap will be made on the breaker picker. Waste should be fed regular and not too much at a time. In a room where there are several machines the hoppers should all be set to feed alike so that laps of the same weight will be produced. Good piecing should be made on the intermediate and finisher pickers, eveners should be kept cleaned and well oiled, belts well pieced (an endless belt preferred) and kept near the center of the cone, all cages and air flues kept well cleaned so that no obstructive matter will collect in them. All aprons should have the proper attention and be kept at the right tension to keep them from slipping and causing thick and thin places in the laps.



**B. M. Bowen**
West Durham, N. C.

Cards should be attended to carefully, all settings should be as near alike as the card will allow, laps should be put on so as not to cause thick or thin places in the sliver, the calender rolls should turn freely. The cans should not be allowed to run too full or the sliver will be strained. The front knife plates should all be set alike, the doffer and flats should all be set the same at both ends or cloudy and uneven carding will result. The card should be kept sharp and free from mashed places.

### The Drawing.

The object of the drawing frame is to draw out several strands into one and thus reduce the unevenness that might exist in any one of the sliver. There are usually six ends put up at the back, all being drawn into one, the draft is gener-

ally about six, although there are exceptions. The stop motion should be kept in perfect order; the bottom and top rolls kept clean and well oiled, all gears set properly and weights kept so that they will hang on the rollers instead of resting on the weight relieving bars. The cans should be kept properly arranged at the back so that the sliver will not be strained before reaching the frames. The draft should not be too great between the front and the calender rolls or uneven sliver will result. The draft should be just enough to keep the ends from bagging, a little bagging even is better than the opposite extreme. A good test is to take a pencil and press the end down, if the slack is taken up too quickly it is evidence of too much draft. The cans should not be allowed to run too full for when they are so full there is too much friction against the coiler and strained sliver is sure to result.

**The Slubber.**

The cans should be placed at the slubber so that the rolls will not run across each other. The lifting roll should be kept running, steel and leather rolls should be kept clean and well oiled. Sometimes the top back rolls are alowed to run without oil until the hooks or saddles wear to an exact fit, then when the rollers are changed uneven roving will result. There should be twist enough to allow the roving to be run off at the next process without being strained. The roll guide should be kept so that it will traverse as near each end of the leather roll as is necessary. The bobbin should have an even and uniform lay and not be so close that the roving will ride on the bobbin. The tension should be carefully attended to or uneven roving will be made which will result in uneven yarn. There should be a perceptible shake of the ends after the frames are doffed and started up and should remain the same through the filling of the set. Frames should be kept well cleaned so that no lint will be caught and carried into the work. Spindles and steps also should be kept well oiled.

**Intermediates and Roving Frames.**

Intermediates and roving frames should have the same good attention as the slubbers. The skewers should be looked after and those that have become flattened on the bottom end not allowed to run or the roving will be strained. Tenders, when creeling the frames, should be very careful and not piece and run three strands from the back thereby making a heavy place which will cause heavy work all the way through. All single and double should be removed from the bobbin. It is only a habit among the frame hands to make this and it should receive the strictest attention from the overseer and his assistants. A good arrangement of drafts should be on all processes throughout the carding department. I shall not give the drafts here as certain conditions necessitate different drafts. The setting of all rolls should be carefully looked after, their distance to slightly exceed the length of the staple being used. All rollers and clearers should be kept clean.

**Spinning.**

Assuming that the roving is leaving the fly frames in as near perfect condition as it is ever possible to get it, all skewers should have good points on the lower end and lint should not be allowed to collect on them. Creels should be kept clean and a wooden roving rod is better than an iron one because the latter will rust, especially in the summer time if the spinners touch it with sweaty hands. The rollers should be kept in good condition and well oiled and should not be allowed to choke up at the ends. The weights should all hang at the same place on the weight lever, not have some on the end and some in the center. Roving guides should traverse as near the ends of the rollers as possible. Lumps should not be allowed to get in the trumpets and strain the roving. Spinners should be taught to make short piecings in settings in roving and all roving should be pulled off the bobbin and not cut off with a knife. The proper travelers should be used for the yarn being spun with the traveler cleaner properly set, guide wires should be properly set, spindles should be plumbed and set at least once a year. Worn rings or rings of different sizes must not be used. All bands looked after and all slack ones removed and new ones put on. Spindles are to be oiled with a good grade of spindle oil. The rollers should be

set so that their distance will be a little farther than the length of staple being used. The draft should not exceed 12. The spoolers guides should be set so as not to break or strain the yarn.

With the little things above mentined and properly attended to a good grade of yarn can be made.

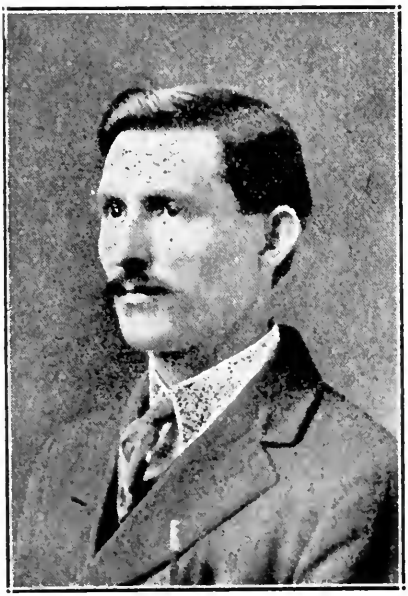
## Number Thirty-two.

By W. T. BYRD, Oxford, N. C.

First to consider is the cotton which you have to contend with. Of course, if the company has a rule to buy different grades of cotton, then we have got to run it in such a way as to get best results possible. The writer was on one job that used three different grades of cotton. We tried mixing it all together, but our work ran so bad that we couldn't run it, so we had to pick it out and get as near a uniform mixing as possible, and run on one grade three weeks, then change our setting for another grade. Of course this was a lot of trouble, and I want to say right here that laziness is the cause of a lot of uneven work.

### Picker Room.

Now, say we run 15 bales of cotton a day and we haven't got a bale breaker. We should bring in 15 bales at one time, and have it mixed together, and if you have room in your picker room, have two bins that will hold 15 bales each. This will give you time to open up and dry out 15 bales before running them. Then you can set your breakers to make any ounce lap, and you won't have to be always setting them. Train your breaker hand to keep hopper about the same all the time. Weigh your breaker laps and try to keep them the same, as this will help your intermediates to make more even laps; never allow your lapper hand to put four laps on apron at one time as this will cause your apron to slip; see that your evener belt works free; never allow them to be put together with anything except cement, as bad evener belts will cause uneven laps, for I am an endless belt man, and this will cover the belt proposition. Next see that your lappers are level, and cleaned up twice a year; see that they are properly oiled; give them a draft of four, as I believe this will give you the best results, and if you haven't got chains on your apron, it will help you if you will get them on. See that finisher hand keeps laps within 1-4 pounds of what they should weigh; see that your beaters are not speeded too high; see that your draft on screens is right, for if not this will cause your laps to split, causing uneven sliver. If all these are looked after, and machines kept in good condition, I don't think you will have any trouble with your picker room.



**W. T. Byrd**
Oxford, N. C.

### Cards.

Now we find that the card has its part to do. If it fails, then we will not get even work. You should see that your cards are level, and kept sharp and all parts set alike; that is, doffer, lickerin, feed-plate, comb, and flats. You should see that every card takes out the same amount of stripping, and see that your fly is about the same for each card. The writer took one job where there were cards that were taking out lots of good cotton underneath, and the grinder said he hadn't set the

screens in ten years, when they should be looked after every six months. Lickerin screens and mote knives should be looked after every month because if these get out of shape, it will cause the card to throw out good cotton, causing uneven sliver. See that the card hand doesn't lap his ends, see that he pulls out all doublngs and singlings, never allow him to pull stick out of lap too soon causing a roll on the floor. This will cause uneven sliver. See that your cards are stripped as often as they need it, and this will depend on the amount of stock you run. Try and give your cards the proper draft—95-105 would be in the bounds of reason to get best results. I don't think cards should card more than 175 pounds per day. I think mills today make a mistake trying to put through more than the card can card, causing cloudy carding, which causes uneven work. See that your cans don't run too full, as this will cause your sliver to be weakened. Look after your setting and grinding, as this needs every man's attention. Don't put too much confidence in your grinder. See that cards are properly oiled and cleaned. If these things are looked after, I don't see why your cards shouldn't do good work. Now we come to the drawing.

**Drawings:**

See that your drawings are lined and level; see that your rolls are cleaned every week and properly oiled and that all knock-off motions work free; see that your rollers are varnished every week; and see that all loose rollers are taken out. If metallic, see that they are taken out every week and the ends cleaned and fresh oil put in them. If this is done, I find it will prevent lots of slack ends. See that tension is right; see that clearers are cleaned every hour; see that your weights are right; never allow your drawing hand to put seven ends up when six are required; see that he doesn't put cotton under the spoons. If you have electric stop motion, see that all connections are clean. Never allow cotton to get on rollers; see that oil is kept off of machine where electrical connection is made; see that your magneto is looked after; don't put too much oil on bearings, as this will make your current weak, if it gets on brushes. Of course the greatest thing to look after is the man that runs them, for it is hard to keep drawing frame hands. I think we make a mistake when we think anybody can run drawings and cards. I hope the time is not far ahead when we can pay drawing and card hands along with slubber, then it will help us to keep good help, which will help us to keep down uneven work, for it is impossible to get good results when you have got a new drawing hand every month. See that your drawings have the proper draft. 5.50 to 6.00. If you will look after these things, and watch your waste, it will help to prevent uneven work. Now we come to slubbers.

**Slubbers, Intermediates, Speeders.**

See that your slubber is lined and level; bobbin and spindle gears set right; all lost motion out of spindle and bobbin shaft; see that spindles are taken out once a year and bolsters cleaned out; flyers cleaned out; steel rollers and carriage cleaned twice a year; see that your steps are oiled every month; spindles oiled twice a week. Give your slubbers the proper draft; see that tension is kept right; rollers picked and oiled every day; see that no bad rollers stay in frame; see that sliver guide is in good shape, and that you have the same twist, draft, tension, and lay gears on each frame of the same number. See that ends are pieced right; keep clearer clean; see that rollers are wiped with cotton instead of brushes; don't allow your hands to fan off, as this will get on roving. Look after your skewer sticks, and see that they don't get blunt, causing roving to stretch, and keep cotton from around them. Never allow frame hands to let singlings and doublings go; see that they wrap fingers three times. See that your frames are kept in good shape and well oiled and you will make good work, if you will look out for the things mentioned above and keep them right.

**Spinning:**

Roving reels should be wiped at least once a day; roller bars should be wiped every two hours to prevent trumpets from getting chocked up, as this will make roving hard to draw. Spinners should be taught to blow or fan all the lint off of the roving before setting it in the frame, as this too will

cause your trumpets to get chocked up, thus preventing an even draft. The rollers should be kept well lubricated with oil. Good rolls should be run in the middle as well as in the front, as drafting is done between the middle and front rolls. Only enough drafting should be done between the back and middle roll to keep the roving from slacking, as middle and back rolls are not set the proper distance to draft and the more drafting done between these two rolls, the more uneven yarn you will have. The front and middle rolls are built to do the drafting, and they should be set according to the staple of the cotton being run, I would say from 1-8 to 3-16 further apart than the length of your staple is. Lap rolls should be kept clean at all times, but no definite time can be set as to how often they should be cleaned, owing to the different counts run, and we all know that coarse counts will get rollers dirty quicker than fine counts; so clean them as often as is necessary is all that can be said.

The thread guides should be set so as to hold the thread to the center of the spindle. The ring rail should be perfectly level, as the yarn has to drag the traveler around the ring. The size of the ring should be governed according to number of yarn being spun, as all spinners know too large a ring will result in uneven yarn, as you cannot get your traveler regulated to suit both the empty and full bobbin, as the traveler that is heavy enough to keep the balloons from striking together on the full bobbin will stretch the yarn on the empty bobbin. The weight of the traveler should be so regulated as to be light enough not to stretch the good yarn.

If the yarn is to be wound, too great a tension should not be placed on it there ,and wherever it is used after it is spun, care should be taken to see that too great a strain is not placed on it, as it can be ruined after it is spun.

"It is not he that knoweth, but he that doeth my sayings, that shall inherit eternal life," sayeth the Lord of hosts. It is not so much in what a man knows in this enlightened day, as in how he doeth that which he knows, and he that properly looks after the above mentioned things will not be haunted by uneven yarn. Lots more could be said on this subject and then the half would not be told, but space demands that I ring off.

## Number Thirty-three.

By W. P. LEE, Lenoir, N. C.

Speaking of a few things in regard to causes and prevention of uneven yarn, the first thing to be considered is cotton. The staple or length of its fibre is of greatest importance, as it determines the quality of yarn produced, also the size and setting of drawing rolls on different machines, etc. Where fine yarns are to be made, a good grade of cotton is absolutely necessary. Beaters should be reduced to 1000 R. P. M. as the yarn will be stronger than with a fast beater speed. Feed roll should be set to beater thickness of a 2-foot rule, grids set to keep good cotton from mote box, laps kept as uniform as possible. Evener motion should be near driving end of cone, waste must be mixed as evenly as possible, otherwise uneven and bad running work will follow. Pickers should be clean and oiled at all times.

Cards have a very important duty to perform. The proper setting of the various parts of cards is very often slighted and the quality of the work suffers thereby. Cards should have very close adjustments. Too much attention cannot be given to clothing, grinding, setting, cleaning and operating cards. Split or uneven laps, dull clothing, clothing that has been mashed in places, uneven setting of the doffer, or flats, not being evenly set at both ends, too much draft between calender rolls and coiler heads, cans under coils running too full, cards not being properly cleaned and oiled, card hands fanning off fronts of cards. These are a few of the many things about a card that cause uneven work, and they should have the closest attention.

Cards should be stripped every other one on a line at a time, in the mean time teaching the hands not to put up ends until the cylinder is

sufficiently filled up. On fine work light card sliver and slow carding will give the best results. Cards should have as even a humidity as possible. Licker-ins are largely responsible for the class of work produced and must have close adjustments, and the best of attention.

Where extra good quality fine yarns are wanted, lap machines and combers are used, though they will produce considerable uneven work if not properly kept up. Lap machines should have as short a draft as conditions will permit. Knock-off motions must be kept in working order. Leather rolls should be kept clean and free from lumps in ends. They must be newly varnished often. Steel rolls must be scoured once a month. Laps should be put on as evenly as possible. The polished sliver plates must be frequently polished with whiting. Machines must be carefully cleaned and oiled at regular intervals. Combers must have uniform setting. I will not give rule for setting, as grade of cotton, amount of waste wanted out size laps, are to be considered. Combers should be torn down to upright stands, carefully cleaned and scoured, resetting and removing all worn parts before putting up the machine. This should be done twice a year. Half laps must be kept free from hooked ends. The sliver pans and plates must be polished frequently with whiting. Half laps and top combs must be examined often and kept in good condition.

Leather detaching rolls must be newly varnished once a week. Draw head must be kept cleaned and oiled, also leather rolls kept in good condition. Laps should be set in as evenly as possible. Uneven work may be caused on draw frames by running in too much waste at one time, rollers not being properly covered or weighted, as improperly oiled rollers may be choked at the ends with waste, or not properly adjusted with the staple being used, and clearers not being clean.

With the above things in good shape, rollers should be set with front rollers 1-8 inch farther than staple, middle and back 1-16 inch. Frames should not exceed a draft of 6. Steel rolls should be scoured once a month. Speeders, excessive drafts and rollers improperly set are the most frequent causes of uneven roving. Draft of 4 on slubbers, 5 on intermediates and 6 on fine frames would not be excessive, though slightly under the above drafts will be better if conditions will permit.

The setting of steel and leather rolls depends somewhat on the conditions such as cleaning, oiling and condition of leather rolls. With everything in good condition, the rollers set 1-16 farther than staple being used will give the best results.

The roving traverse must be kept moving. The tension of the ends is very important. If they are too slack, roving will be too heavy and if too tight, strained and light roving will result. The top cones must be kept tight, cone belts clean and free from slippage, and spindle and bobbin gears kept properly set. The lost motion on vertical angle and compound must be kept out. The proper lay gear must be used. One full and one half full bobbin should be run at each end at a time. Flyers must be free from rough places. Speeder hands should not be allowed to stuff cotton under slats when bobbin gets too small. Two or more sizes of bobbins should not be used on a frame at the same time. If they are, an operative will take up tension for the small size that is running slack. The larger one will then be too tight and stretched roving is the result.

The roving should not have more twist than is necessary to turn bobbins in the spinning room. Singlings, doublings, and hard ends should be avoided at all times. Four bobbins from each hank roving should be sized daily and kept as uniform as possible.

**Spinning.**

It is useless to say that the most fruitful cause for uneven yarn on spinning frames is the rollers. They may be dry, fluted, worn, or choked with waste or improperly set. The setting of the steel and leather rolls depends a good deal on the above conditions. With every thing in good condition, the setting should slightly exceed the staple being used. On medium and fine yarn, where good grade cotton is being used, back saddles should not be used. I would also use a slight draft between middle and back rolls. This will enable us to get a closer setting, which means smoother yarn and better running spinning.

The draft of the spinning frame should not exceed 12 at the outside,

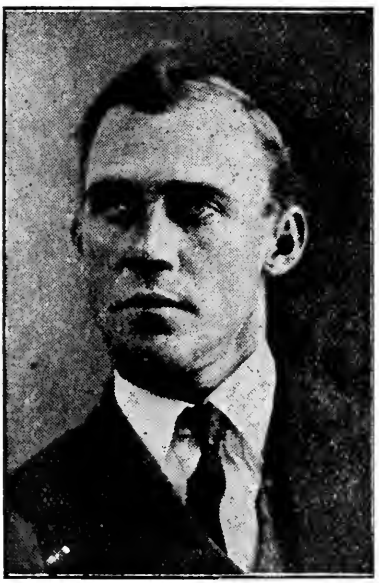
and if conditions will permit, a draft slightly under that will give better results. Rings and spindles must be set and plumbed at the top and bottom once a year. Worn rings must not be used. The size of the rings is governed by the number of the yarn being made. The proper travelers must be carefully selected at all times. Traveler cleaners must be used, to keep travelers from being choked with lint. Worn guides, guides not being properly set, spindles vibrating for lack of oil, bands running slack, slack belts, excessive speed, draft or crown gears not being set deep enough, so they slip a tooth occasionally or being set too deep and causing the rolls to quiver. These are some of the things that cause uneven and bad running spinning. Bad work will also be caused by steel rolls being bent; or worn at stands, causing lost motion; flat flutes may be scratched, broken roving sets or skewers with blunt ends; yarn getting too light or heavy; spare roving left on frames too long, trumpets choked with lint; levers not level; weights not hooked on levers at same hook; improper humidity, roving traverse standing at one place; one end of steel or leather rolls becoming roped with cotton, not allowing other end on same arbor the proper tension; leather rolls in poor condition; giving spinners more sides than they can efficiently keep up; not keeping frames properly oiled and cleaned. All these little things should be guarded against at all times.

After the yarn leaves the spinning frame, it can be shaved and otherwise weakened by the spooler and winder guides being improperly set, twister rings being out of plumb, worn twisters, or travelers, etc. Many other things could be mentioned in regard to uneven yarn, but for lack of space I will not go farther into details at this time.

## Number Thirty-four.

By J. A. PARKER, Greenville, S. C.

We will first take up the many causes that contribute to the unevenness of yarn.



**J. A. Parker**
Greenville, S. C.

The first and direct principle of making yarn is drawing a small portion of fibers from a larger body of fibers and twisting them, causing same to form a thread or yarn. Too much twist in the roving, causing stock not to draw easily and slip under middle roller and not draw uniformly.

If roving traverse stroke is too short, the middle top roller will become hollow or creased, allowing stock to slip from under middle roller, which shows much irregularity in yarn.

Hollow middle rollers on any process throughout the card room, will cause uneven roving or sliver, and shows up badly on yarn, when the doubling does not match up and offset same.

It's a fact that yarn has short and long, thick and thin places. The spinning frame is responsible for the short, uneven places in the yarn, and the longer places are drawn out from uneven roving The best demonstration of the above fact, is to carry stock from slubber on through your regular processes, and spin same, which will show where most of your unevenness is

made. After leaving drawing frames, this stock should go through single.

For example: Take length of thick or thin place in yarn and divide by draft, on spinning head. Repeat this operation at each process until length of uneven place is less in inches than draft. , which shows the process it started on. The overseer should teach the help to piece roving tip to tip when creeling. Tight tention on flyer frames, causing twist to slip after being laid in roving, which will draw very uneven on spinning.

Loose cotts or drawing new cotts on old flannels or large ended rolls, dry saddles on top rolls, any of the above in card room or spinning room will make very uneven yarn.

The overseer should have very rigid rules on cleaning steel rollers and top rollers; be careful to see that all chokes are kept out.

Roller setting is a very vital point in making uniform yarn. You have to be governed by the weight of stock you are setting for. Too close to point of staple on heavy stock is just as hurtful as too far off. If you are carrying an over amount of twist in roving, you have to set rollers off, to allow stock to condense free, and not draw uneven.

There is quite a lot of unevenness in yarn caused by improper draft. There is a standard draft on all the different processes that is a good guide for an overseer to be governed by. 7-inch draft on spinning head, single roving, is commonly known as the standard basis to reckon from.

It's a known fact that the best results are obtained from a 7-inch draft under all conditions, with single roving on spinning. That is where 7-inch draft originated for a basis.

A draft too short draws the stock too much in a body and tightens the twist in roving and lets loose in bunches, which causes uneven yarn.

A draft too long gives you bad results from having to use a very heavy hank roving, which carries more short fibers, and while the long fibers are being drawn out, the short fibres follow in bunches causing thick and thin places. Good results can be obtained from a 20-inch draft on spinning head by using a light hank roving 3 or 4 double.

It is possible for a perfect strand of yarn to be made out of cotton, but not probable, as it would be more expensive than silk.

Cotton, like other plants, has a nature peculiar to itself. A bale of upland cotton 1-inch staple will possibly have 25 per cent 1-inch staple, 50 per cent 15/16-inch staple, 15 per cent 7/8-inch staple, 10 per cent 3/4-inch staple. Another bale grown from the same seed on the same farm, under the same climatic conditions, and planted on same date, only growing on bottom land, has 50 per cent 1-inch staple, 40 per cent 15/16-inch staple, 10 per cent 7/8-inch staple. Now it is impossible to mix these two bales of cotton and get perfect results, either in combed stock or carded stock.

For a perfect strand of yarn we will use 1 3/16-inch staple, according to writer's experience on staples, 1 3/16-inch staple has proven to be the best average American staple.

This cotton must show 50 per cent 1 3/16-inch when pulled. It must go through pickers very light and carded with 15 per cent waste and combed with 50 per cent waste, leaving us as a result all your fibers a perfect uniform length, with proper doublings, light hank rovings, proper drafts, low twist, no tention, bites of rollers up to point of staple, and your different machines properly adjusted, you can spin a strand of yarn uniform and round.

## Number Thirty-five.

By E. G. WAITS, Goldville, S. C.

If I understand this contest, uneven yarn means what we generally call lumpy and thick and thin places in yarn. So I will begin at

**Opening Room.**

I think every opening room should be equipped with a heating system so as to keep an even temperature in this room at all times. Why should this be? Because some cotton has too much moisture in it and dries out between pickers and roving frames. With the opening room heated to about 90 degrees, it

would dry out this excess moisture that now causes us to do so much changing in our draft gears. When we are all the time changing draft gears, we are causing more or less uneven yarn. The cotton that did not have too much moisture in it would not dry out any with a temperature of 90 degrees in the opening room. We would then get an even moisture in our cotton which means evener yarn and less changing.

**Cotton.**

Uneven staple causes a lot of uneven yarn. If we had a thousand bales of cotton to run through a mill, 500 of which was 7-8-inch staple and the other 500 bales 1 1-8-inch, we should not mix this cotton. We should set our machines and rollers to suit the 7-8-inch staple and run it through and then set the machines and rollers for the 1 1-8-inch staple. Uneven staple will certainly cause uneven yarn, as no settings will suit mixed length staple.

**Pickers.**

Uneven laps mean uneven yarn, although even laps do not mean even yarn every time, as there are so many places where it can be made uneven, through the carding and spinning rooms. How can we make even laps on picks? If the breaker laps are uneven, we get uneven intermediate and finisher laps. In order to get even laps on the breaker picker, the feed box should be kept with the same amount of cotton in it at all times, and we should see that every part of the machine is doing what it should do to make an even lap. See that all gears are tight on shafts and rollers. Also see that the screen is tight on shaft and clean and that the air current is sufficient to draw the cotton from beater box without allowing the cotton to drag and come up in bulks to the screen. The aprons and belts must be tight enough not to slip. See that the friction pulley is not too tight so as to stretch the lap. Dull beaters and far off settings will cause uneven laps. Keep beater sharp and set it just as close to feed roll as possible to do without damaging the staple of the cotton. Avoid starting and stopping pickers with feed gear in gear with feed roll; this will cause uneven laps; always knock the feed roll gears out of gear, for if you don't it will cause uneven laps.

**Cards.**

I will start with an even lap on back of card, and suppose that the card hand should piece laps at back so as not to make a thick or thin place in the sliver. The following things will cause uneven yarn: Licker-in bearing set too far off from feed plate; dull licker-ins; flats set to far from cylinder; card not cleaning the sliver, but allowing the motes and trash to go through; jams on cylinder and doffer, cutting holes in sliver; doffer combs that catch the sliver and let it off in bunches. Keep the combs so that they will not hang the sliver. Keep all gears set tight. I have seen the draft gear on a card on the outside shaft just turn the feed roll about half way round, and then feed roll would stop for a bit. Keep all gears set about two-thirds in mesh. Another cause at the cards for uneven yarns is allowing cans to run too full, which will stretch the sliver.

**Drawing, Roving and Spinning.**

Anything that will cause rollers to bounce and drag means uneven yarn. Too long a draft in any process, too much twist in roving, carriage standing on change, forming a knot on the end of the bobbin, are other causes for uneven yarn. No frame tender should be allowed to lap ends or not splice end to end. Both rollers on one arbor should be the same size in diameter, otherwise uneven work will follow. Grooved rollers will cause uneven yarn; all rollers should be smooth and as stated above should be of the same diameter where there are two rollers on one arbor. All rollers should be kept clean and well oiled so as to turn free and easy, and not allowed to drag. All rolls should also be set to suit the staple of the cotton in order to get even yarn. Tight ends, stretching the roving, is another cause for uneven yarn; ends should be run as slack as possible to run good on every machine. Keep clearers clean so none of the clearer waste will pull off and go through on sliver, and see that no machine is fanned off with a fan rag unless it is clean, for if they are dirty and covered with lint, it will get on roving and yarn, and cause uneven work. It should be the desire of every carder and spinner to improve the sliver and yarn at every process through which it goes. Never allow sliver and

yarn to be made worse at any process, and more uneven. If anything see that it is made a little bit better at every process.

## Number Thirty-six.

By R. M. BARNHAM, Mayodan, N. C.

I think one of the greatest causes of uneven yarn is uneven top rollers, and as long as we have untrue rollers we will have uneven yarn. If one end of the roller is larger than the other it will not bear evenly on the steel rolls and will not run true on the steel roller. For one end has more running surface than the other, which will cause one end to run against the capbar harder than the other until it slips, and when it slips it makes uneven work. All rollers should be of the same size, for if one is larger than another, it will have more cushion, and one will bed in the flutes of the steel roller and cause the fibres to crimp and when the fibre crimps in the flute deeper than the others, it will make the yarn light, because it gets the top and bottom surfaces of the flutes of steel rollers by having a greater cushion. And it has its effect on every machine it goes through, and by the time it goes through the mill, you not only have uneven work, but you have a great variation in your work, for the work will not draw alike where one roller has a greater cushion than the other. There is only one way to overcome this trouble. That is to grind the rollers down until they are perfectly true, for I think all rollers should be dressed up, for it takes all of the high and flat places off of them and gives them a good, true and smooth surface. Until you get this, you will always have uneven yarn.

Of course there are people who try to roll the rollers true and some burn them down, but I do not like either method, for either way takes away the quality that you get from covering, for the rollers are hard and they do not bed in the flutes of the steel rollers as they should. You may as well have steel rollers without flutes if you do not have rollers that will cushion and get some grip to prevent the fibres from slipping. I do not see how you can expect to get even yarn with burnt down or rolled down rollers, for there is no way to burn or roll them down all alike. You would burn down one end more than the other, if you get them true, and the same is true of rolling them. Rollers of this kind will cause uneven work because they will not cushion alike.

A good, smooth, true, soft, springy roller that will let a hard end come through and then spring back to keep from cutting the next time traverse carries the roving across is one of the greatest features in making even yarn when all steel rolls are running true.

Of course there are other causes of uneven yarn, such as uneven laps, bad carding, not enough moisture, rollers not properly spread, too long a draft, too much twist in roving, bad piecing all through the mill. This is what the majority of the writers will write about, and that is where I think they are in error, for I do not think that any of the above will do as much bad work as bad rollers will. It is impossible, I think, to make even yarn without good, smooth, true rollers, so if every reader of this article who is having trouble with uneven yarn will put this in practice, I am sure he will find a great improvement in his work.

## Number Thirty-seven.

By JAMES OATES, Siluria, Ala.

The subject for this contest is a good one, and I am glad to have the opportunity to give my experience on this line.

To begin with, I will go to where the cotton is stored away after picking. In may cases we find that the farmer stores his cotton in a cotton house while it is damp, and sometimes, even while it is wet. Even though this cotton contains the seed and is stored in a compect manner, it becomes mildewed, and to a certain extent becomes weak

and rotten. This evil can be prevented by being sure that the cotton is dry before it is packed away to await ginning and at the same time if the cotton goes to the gin while damp, we need not look for good, even ginning, as we all know that damp or wet cotton cannot be ginned well. This can be prevented by taking precautions along this line. In my judgment, to even get first-

**James Oates**
Siluria, Ala.

rate yarn, we should bear in mind that after the cotton is taken from the cell in which it grows, it must be treated very carefully, and the quality of the yarn produced depends on the treatment it gets.

I shall not discuss buying cotton.

**Mixing Cotton in the Opening Room.**

The matter of making up a mixture of cotton at the opening room is an important problem. We might say that the evenness of the card sliver depends largely on the average mixing. It is a good policy to assign a special man to see to the mixing of the cotton. If it is mixed at random, we get our quality at random throughout the following processes. To prevent this careless mixing, the overseer should see that it is properly done. To obtain good even mixing, take say one bale of first, one bale of second and one bale of third, and so on, and tearing it into small tufts allow it to stand a day or so if possible. Give the fibres time to expand as much as possible so that when the cotton is fed to the opener it will receive the full benefit of the opening process. It is a fact that the picker cannot do the work of the opener, so the opener is essential to begin with. Improper mixing and opening cannot be rectified at the next process.

Next, we pass on to the breaker, where the cotton receives practicall its first beating or cleaning action. These beater wings should be kept in first-rate condition. There are in the picker room breaker, intermediate and finisher pickers. How well the carding can be done depends on the beating and cleaning of the cotton, also how even the sliver will be. Excessively heavy laps to the yard will produce bad, uneven work for carding. To prevent any uneven card sliver, is in my jurgment, to produce good work, with a 9-ounce lap, the card kept in good condition, card light and quick. At this process of carding, it is essential to good, even yarn in the spinning, to keep the proper setting at the proper places. Carding is the place where the fibres are laid paralelel with each other. I think carding should get the very best care that can be had, as here the very small pieces of foreign matter are taken out.

Now after getting our sliver in good condition on the cards, we take it to the drawing frames. At this process, metallic rolls are generally used. Getting these rollers mixed will cut the stock and cause uneven work. These rolls should be kept clean and oiled when necessary. The draft here should not exceed 6 inches for the first drawing. The second drawing should be treated in like manner, with a draft of 5 3-4 inches.

The sliver from the drawing frames is taken to the slubber where it is started in the form of being placed on bobbins. The slubber is a machine that needs a very cautions watch kept over it. The draft on the slubber should not exceed 5 inches at most, or be less than 3 1-4 inches, depending, of course, on the length of the staple. Rolls set too far apart on this machine with short cotton will make uneven roving.

Gentlemen, let me emphasize right here, that if drawing sliver and slubber roving is made uneven, it cannot be rectified in the succeeding processes.

It would take too much space to give all causes and remedies for uneven yarn. Different size bobbins will cause uneven yarn, as will too tight a tension on the slubber. Weather conditions affect the ten-

sion on the fly frames, in some cases enough to justify changing the tension gear. After maintaining the slubber in good condition, the same troubles are to be overcome on the intermediate as on the previous machines, for the roving is next run on the intermediate. The draft on the intermediate should not exceed 5 1-2 or 6 inches. Then the finisher flyer frames, where this roving from the intermediate is used. has the same troubles to be overcome as the previous flyer frames.

I shall name some of the causes and remedies for uneven yarn caused in the carding department. These are cloudy and uneven carding; overdrafts; weights too heavy; dirty rolls on drawing frames; dry rolls on slubber, intermediate and finisher fly frames; lost motion in gearing; poorly balanced carriage and allowing frame hands to take up the tension. I think it is a bad practice for the overseer to allow in his room anything that will reflect on the quality of the finished product of the mill in which he is employed.

Gentlemen, I do not contend that uneven yarn cannot be made in the spinning department, and I will discuss that later. But I do contend that the greatest number of causes and remedies are largely found in the treatment of the cotton in the various machines which it must pass before it reaches the spinning department. However, nowadays, it has become necessary for every one concerned to take precautions against bad work.

It is not what a man knows that helps his employer out on any evil, but it is the employee putting that which he knows in practice. Listen, friendship and harmonious relations have just as much to do with good work as anything I know of. Please pardon me, but be business-like with every employee. I think the overseer should be a positive instructor and leader for his help. Practice will prevent uneven yarn to a certain extent. As a matter of fact we are obliged to confess that we find in the carding department a tendency to get a large stock of roving ahead of the spinning for different reasons, such as having more time to clean up, wanting a day off, or some similar reason, failing to have in mind the amount of uneven yarn this rushed through stock will cause. Now, to prevent this evil, the carder should keep in mind that when he is done with the stock, that it is just in the youth of its construction.

Please keep the making of roving well fixed in your heads, as on it depends the making of even yarn.

**Spinning.**

To begin with I will say that spinning is the place where the body of the yarn is formed by attenuating the roving to the required size or number. But in view of the fact that uneven yarn is our subject and to give causes and remedies in spinning, I will assume that I have good, clean stock as roving from which to make this yarn.

Some of the causes of uneven yarn are: Back lash in gearing; stopped up roving trumpets, or roving traverse not in motion, and causing rolls to crease; too much twist in roving for weights to break; rollers set too close, breaking the fibres; rollers set too far apart, and fibres slipping by each other; overdrafting; poorly set top leather rolls; roller cots not right on tension; thick and thin skins on solid rolls; levers resting on creel broads; rolls run too long leaving on old tension.

However, I want to say that an up-to-date overseer, who is not afraid to do or have done this work, can remedy each and every cause which I have previously mentioned, by doing nothing less than run the job. Let's reason together that if roving is more even with the above causes rectified, then you are sure to get good even yarn on an average.

## Number Thirty-eight

By L. R. SUMMEY, Belmont, N. C.

My experience on yarn is that we must start at the coiler room. First have the screens in good order, and second, have every lap weighing correctly. If a lap is one ounce off in weight, it will make singlings on cards. Third, have the card ground right. I mean by this, not to have

a jackleg grinder, for some of the best get careless in putting the card up. They have the most of the fiber going into the fly by not setting right.

Fourth, we must have our counter belts pulling level. If they are not level, it will cause the frames to shake, making light places in the yarn.

Fifth, have the drawing rolls cleaned once or twice a day to prevent lumps. The machine must be clean every week. I mean by this to take the rollers out and scrub them. Then oil them and put back. See that none of the rolls are jumping, for if they are, it will cause uneven yarn.

Sixth, beware of singlings. See that no such work goes through.

Seventh, have first-class rollers on speeders, so they will run smoothly.

Eighth, we must have our rolls set to right and correct gauge to the staple of cotton we are running.

Ninth, we must see that the frames are kept in good order, meaning by this that they must be kept clean and the sampsons running smoothly to prevent the cage from jumping.

Tenth, the cage jumping stretches the roving and many think the trouble is in the draft, and will change the draft and make things worse than before.

Eleventh, have correct tension gear to prevent tight ends, and do not allow the hands to change it. Sometimes they change the tension when it is unnecessary.

Twelfth, see that you have no tight spindles or loose bolsters, as these make uneven yarn.

Thirteenth, clean the frames from the rollers to the spindle gears from every 3 to 6 months.

Fourteenth, have the frames oiled well every day to make them run smooth and prevent uneven yarn.

We must have our belts pulling steady. What I mean by this is that they must not have too much slack. If they have they will jump and cause uneven yarn. A frame cannot make even yarn when the counter belt is jumping, because it makes the frame jump when running, stretching the roving and making uneven work.

## Number Thirty-Nine.

By F. L. ABERNATHY, East Monbo, N. C.

In discussing the subject of the causes and preventions of uneven yarn there are a great many things to consider and I would like to say in the beginning that I do not expect to give all the causes and preventatives of uneven yarn. However, will try to give some of the things which I have learned from experience. A great many times we find the cause of uneven yarn brought about by not taking the proper care in selecting the raw stock, that is, not buying the grade of cotton that should be used on the particular grade of yarn we expect to turn out. If we do not have this we have a hard proposition trying to make even yarn, but some times by the proper care taken in mixing we can overcome some of the causes of uneven yarn. I would like to say here that if we expect to get good results we should always select our cotton before mixing, so as to get a good average of whatever grades of cotton we have and get a uniform mixing and let it air out, say a week before using.

To begin with the picking department, always keep your hopper or breaker lap machine filled about the same, so as to get a good, even feed on your machine, say about two-thirds full. Have a good evener on your intermediate picker and get as near an even lap here as possible so you will not have trouble on finisher for an uneven lap will sure give you uneven yarn. So be sure your laps are a certain weight, yard by yard, as nearly as you can possibly get them, and see that eveners work well and that you have a nice, smooth lap. It is a good idea to weigh your laps from time to time, to see if they are correct by the yard, as well as by the finished lap. Don't beat your cotton too much. I have seen the quality of yarn increased in strength by disposing of one of the beaters.

With a good even lap for cards we should not overlook them if we want good results. We should not try to card too heavy a lap and have our feed so as to not let our licker-ins cut the cotton too much.

See that each card is ground properly and all parts set the same on each card and keep them stripped out systematically. Grind your cards as often as is necessary to keep them sharp.

The drawing frame should be watched very closely for right here we are sure to get a lot of uneven work if we neglect this machine, and very often this is done. Look after your rolls carefully and keep them properly set for your work and don't get them too wide apart. Keep your weights well adjusted. A way to do this is to clean your rolls every week and look over your settings. See that your trumpets are all bored the same and look out for your draft between front and calender roll or you will stretch slivers. All these things will give you uneven work if not kept in proper shape. Do not draw too much here, not over six.

On fly frames we get a lot of uneven work by not looking after tension. This I think is one of the greatest sources from which uneven yarn comes and it requires a lot of attention to keep tensions right, and if not looked after properly the hands will take up or let off on rack. This should never be allowed. Twist is another very particular and deceiving evil, and a great many times you will find that just enough to keep roving from breaking back in the creels will seem to be sufficient, but by careful examination you will find your roving stretching just enough to weaken your yarn. I believe that a great deal of our uneven yarn comes from either too tight a tension or not enough twist. Of course there are many other sources of unevenness, but if you will look after the things above mentioned and keep your rollers in good shape, that is, properly cleaned, oiled, and all bad rolls kept replaced, rolls properly spaced for your staple, and your drafts not too long, you can expect to get a fairly even yarn.

On spinning frames I find that the cause of most of our uneven yarn is brought about by the little things which are more than likely to be neglected and they are many. Of course, we suppose that we have good even roving to start with. See that your roving has plenty of twist in it, that is just enough to keep it from stretching while passing from creel to rolls. Second, do not draft over ten, on double roving or seven on single, if you want good even yarn. Keep your top rolls in good running order, have them well cleaned and oiled as often as is necessary. To keep them clean, a good plan to work by is to have section man go over all his rolls at least once a month and take out bad ones. Space your rollers to suit your staple and it is well to watch them and see that they are kept right. Don't have your levers with the weight wires partly in first notch and partly in second and some resting on creel boards. Keep them well leveled and weighted. All hanging in same notch. Look out for crooked spindles, spindles vibrating for lack of oil or worn bolsters. Be sure to keep ring rails level and look carefully after your travelers and see that they are not mixed.

All these little things will give you an uneven yarn if they are not kept in proper shape. Another source of uneven yarn is sometimes, through carelenssness, the wrong twist or draft gear will be put on some of your frames. The writer took charge of a spinning room one time and found three different sizes of draft gears running, which were supposed to be making the same yarn, so this is very important and should be looked after.

In conclusion, I would like to say that if you will look carefully for the little things the larger ones will be found.

## Number Forty.

By B. L. DOBY, Lumberton, N. C.

The opening room is where we start the manufacture of cotton yarn. Here we must take in consideration that we must have a floor space large enough to open up six or eight bales of cotton to get the proper results, as some of the cotton is grown in one State and some in another, and we are sure to have great difference in the staple of the cotton. By opening and mixing the several different bales, we get a

more uniform grade. We must keep in mind that wet or damp cotton will give us trouble throughout the plant and our weights will be hard to keep up.

Now we come to the pickers. Here we must be very careful to have the hopper feed evenly and not allow the picker man to let the hoppers be full of stock at one time and run empty another, as this will cause thick and thin places in the lap. We must have the aprons on the lappers kept in good condition and see that both sides are set properly, as the aprons play an important part in making even laps. Then too, we must see that the evener belt is kept in good shape, so as to perform its duty in making an even lap. See that the lapper man never sets aside a lap to be delivered to the card that varies over 1-4 pound. The lap should be handled carefully by the operatives when delivering it to the cards.

Now we come to the cards, one of the most important processes in the manufacture of cotton yarn. See that they are set properly and kept clean at all times. They should be stripped out at least 4 times a day. Great care should be exercised in putting up the ends. Do not allow the operative to lap the rolls together, as this makes a heavy lump all the way through the rest of the process of manufacture.

We next come to the drawing. Here we begin to double the process. Six rolls are run in one and we should see that the operative looks after them very carefully. Never allow him to start the drawing for the purpose of putting up an end, and hold the machine running with only five rolls instead of six, as this will cause much trouble all the way through. Use care and do not draft too much on the drawing, as here the fibre oftens gets cut and looks cloudy and wavy when it is delivered to the calender rolls. We should never allow this condition to exist, as we are sure to have uneven yarn from this cause.

We now come to the slubber. Here we must watch very carefully and see that the tension is kept well regulated, otherwise it will cause trouble. If it is too tight or too loose, it will allow the roving to become stretched or rolled up around the tops of the flyers and it will be drawn on the bobbins in wads.

Coming to the intermediate, we again have a process where we must see that the machinery is kept clean. Never allow the operatives to lap the ends or make hard ends. Here we start at the point where singlings and doubling are often made, and we should give the operator strict instructions in regard to this menace, as singling and doubling are sure to give you trouble through the rest of the process of manufacturing the yarn.

At the fine speeders, we should at all times keep the rolls oiled and cleaned and see that they are set together to suit the staple that we are running, as this plays an important part in the evenness of the roving. See that the speeder tender looks after the frames and keeps them well cleaned. If he lets singlings pass, charge them to him and you will not find many more.

We now come to the spinning. Here we must bear in mind that we are on the last process in the making of yarn. We can take the best roving made and ruin it on the spinning frames in several different ways. First, by drafting too much; second, by not having the rolls set properly to suit the staple that we are running; third, by cut yarn caused by gears not properly set; fourth, by bands being tied on too slack; fifth, by dry rolls, as a dry roll will not draw evenly. We should have the spinner to keep on the lookout for singling and doubling at all times. See that the travelers are well regulated, for a traveler too light will allow the spinning to make single yarn where we are running double roving, and on the other hand a traveler that is run too heavy will cause the ends to break down and keeps the spinner constantly putting up ends, and you are sure to have slubs in the frame. The draft gears should be examined by the section man occasionally, who should see that the stud pin is not worn off, for this will allow the gear to slip a little now and then and results in cut yarn. We must keep in mind that improperly covered leather rolls will give a lot of trouble and cause unevenenss in the yarn, if we allow them to be used. A burr on the steel roll will cause uneveness, a dry spindle will cause improperly spun yarn.

Next we come to the cone winder. We cannot change the yarn here, but we can see that the winder roll

is kept free from burrs and see that the slub catchers are properly set to suit the yarn. Do not have them set close enough to score or cause a fuzzy-like appearance of the fibre when it is finished, as we can save many a slub by giving it the proper attention.

## Number Forty-One.

By J. H. JENKINS, Hillsboro, N. C.

I want to thank Mr. Clark for the opportunity of allowing me to publish in his paper the opinion I have formed concerning "Cause and Prevention of Uneven Yarn."

Keep your cotton as dry as possible, as you cannot keep your numbers even with running wet cotton one day and dry cotton the next. Different grades of cotton not mixed makes bad work on pickers and cards, in fact on all the machinery used throughout the mill, such as speeders, spinning frames, etc.

Suppose you have 2 or 3 different grades of cotton to run. Run one grade and see that all the waste is put in of that grade regularly each day as long as that certain grade lasts.

See that the drafts on your pickers are the same, so as to make the laps even. Do not let your laps vary more than one-quarter of a pound, if there is any variation at all.

In some mills the card hands resticks the laps. If this is true with your mill, do not let the hands pound the end out of these. Be sure that the cards take out about the same amount of flyings and strippings. Have the hands keep the cards clean so there will be no lint for the sliver to drag upon.

Put laps on even so as to prevent thick and thin places in feeding. Take out all thick places and singling that should pass through the doffer. Piece all ends.

See that your drawing is kept clean at all times. Be sure that your stop-off motions are in good shape, so no bad work will go through. Keep laps on steel rollers clean.

Slubbers should be kept clean and allow no hard ends to be made. Be sure you have the right draft on them. With this little trouble eliminated, you will have good work for the intermediates.

I am sure that if the intermediates are kept clean and properly drafted, and no hard ends, singlings and doublings allowed to be made, you will get good results.

This will put the work to the speeders in good shape. Also keep the speeder room clean, in fact all of the machinery should be kept so. Do not allow bad work to be made. Creel two rows of roving on each frame at intervals.

Have the leather rolls calipered and put them in all frames as near as possible the same size.

If the above rules are carried out, the spinner will have something with which to make even yarn.

Of course the spinner must do his part. He must not allow bands to become loose, and not allow fanning off. Do not give the spinners more sides than they can keep up.

Take out all leather covered rolls that have become loose and have them replaced with new ones. Use the right size travelers and have everybody stay on the job.

After these rules have been carried out, see if you do not have better and more even yarn, and much better running work.

I do not claim to know it all, nor to have told all. But I have had sime experience in this line of work.

## Number Forty-Two.

By W. G. HENDERSON, Columbus, Ga.

I am entering the contest to learn the views of others and to express some of my own on the cause of uneven yarn and the prevention of same. With the 25 years experience I have had in the business, I am still learning the cause and prevention, for there are many. throughout the mill, from mixing to the finished product. I will now try to state some of them briefly.

The first is in the mixing of the cotton. It will certainly make uneven yarn if the mixing is not thor-

ough with all grades. Too much of the same grade should not be fed to machines at one time, for we all know that first, second and third pickings are different grades, and by being well mixed in the percentage in motes and fly will be equalized in the picking process.

We now assume that the cotton is well prepared for making breaker laps. Care should be taken to make all breaker laps as near the same weight as you can, by regulating the feed to deliver same in each guage box. My opinion is that a great deal of uneven work is made in the picker room. As you know, railway heads are very nearly things of the past and we must turn our attention to the picker room, for here we even work to start with. To make good even laps with a good selvage, you must keep your pickers clean inside, and all air flues open and dampers set properly to get a good sheet on your cages, all depends on the length of the outlet flues. In regard to fan speed to regulate the back lash in the air, fan speed runs from 1200 to 1500. As we are counting the railway heads out, we must rest assured we must turn our attention to the eveners on the pickers. Now to make even laps, you must use and endless belt, one inch. Keep the evener belt tight and run it near the center of the cones to allow for variation. If the evener belt runs too slack, it will slip and cause uneven laps. Never use oil on your evener plates, use graphite. Oil will make them stick.

Now the laps comes next, and the way to handle them. It will cause uneven laps if you use the same size aprons on your laps at the same time. You must use two full laps and two half full. This will keep the weight on your aprons regular. Also teach your picker help how to handle laps, as I have noticed some handle them like they were cord wood. A lot of uneven work is caused when placing the laps on, never allow the help to lap the ends too far, for this gives the evener too much work to do and light and heavy places will go by. Keeping up with these little things overcomes the big ones and you will be able to keep the weights within close touch of the standard.

Now we leave the picker room with a good well-made lap, and come to the cards. A draft of 90 is a good card draft. The piecing here is another great factor in making uneven work by lapping the ends over too far on the lap just run out, which makes heavy places in the card sliver several yards long. Teach the help to piece right, so the card sliver will be uniform. Letting laps run out will also make uneven work. The sliver gets light and yards of it has gone to the cans and the card hand does not always get it all out and it passes on in your work.

Now we suppose card setting to be the same, or as nearly so as possible, on all cards in the room I want to say that where more uneven work is made in the stripping plate settings, when they are overlooked and not given the proper attention. It does not show up very plainly, but the amount of strippings from each card should be the same weight, if not, it will cause variations in the sliver, which tends to make light and heavy places. Dull licker-ins will also make uneven work. The stock will be delivered to the cylinder in small flakes. This is what we call cloudy carding, which we can plainly see in the web. The same result will also follow when the licker-in screen is too far from the licker-in wire.

Now we take the card sliver to the first process of drawing, where uneven work is caused by the spoons not working properly, letting the ends pass through the back rolls before the stop motion works, by the drawing tender holding on the shipper piecing ends, also making long lapped ends. All drawing frames have compound change gears which are used for condensing the sliver properly, letting the sliver sag just a little to avoid broken selvages. If the sliver is too tight, between front roll and calender rolls, you will notice the selvage looks ragged making uneven sliver, which can be overcome by changing the compound gear one tooth, or it may call for two teeth, to get results. This articles does not refer to the draft, as we all know what excessive drafts make uneven yarn.

We now take the shell rolls into consideration. Shell rolls covered with blankets too thin will make uneven work, as they are too hard and firm and will not draw the stock uniformly. A good heavy

blanket make a good cushion, which rests on all fibres, drawing them more evenly. A thick skin or a thin one will make uneven work. All rolls should be calipered when putting them in the frame, the same as spinning rolls. Never allow the practice of putting new cots on old blankets.

Now slubbers, intermediates and speeders all have compound change gears, the same as the drawing frames. In some card rooms, the frames are running badly, ends breaking down, running slack, especially before the frame gets full, and some carders think it is the rack gear, whereas he is not using the right compound gear. This will make uneven roving, and that means uneven yarn. It takes a practical man to master the card room, as it is the base of the mill, and if the work is not made right in the carding, you cannot expect it to be right in the finished product.

I am writing this article to learn what makes uneven yarn and what will prevent it. I trust that it will cover some of the important points of the subject. We will not consider the settings, as all practical men know the right settings.

## Number Forty-Three.

By W. G. YOUNG, Louisville, Ky.

This matter has been so thoroughly discussed in the past that it is a difficult problem to bring out any new points that all good carders and spinners are not already familiar with. The following is what I consider the chief causes for uneven yarn:

First. The cotton grader must be a man of inteligence and must know how to grade cotton. He should pull staple from each bale separately and get each mixing as near the same length staple as possible. Staple of different lengths will not draft the same. Cotton should be mixed twenty or more bales at each mixing, taking an equal amount from each bale.

I shall not attempt to give any certain rules for setting pickers or any other machine; it is the opinion of the writer that a competent overseer will know how to adjust his machines to get the best results in his own particular case. I have a very poor opinion of a man who adjusts his machines a certain way because John Smith or Bill Jones had them set that way. We must use our brains and adjust things to suit our own case.

I could say a great deal on split laps, but a competent overseer will not permit split laps to run very long.

The card is, in my opinion, a very important part of the process. without good carding it is impossible to get an even yarn. Poor carding is caused from bad clothing, bad tops, poor grinding, improper setting and carding too heavy. There is more poor carding today from crowding cards than from any other cause. A card is for the purpose of removing the impurities from the cotton, and if we can remove all the impurities the rest is an easy matter. The lighter we card, the more impurities we can remove. Most any man with ordinary intelligence can be taught to grind and set up a card properly if given proper instructions. But no man can do good carding and crowd his cards, and unless we get good carding we cannot hope for even yarn.

We now come to another important process,—the drawing. The chief cause for bad work on the drawing is dirty rolls, especially if metallic rolls are used, bad tension between front roll and calender rolls, and high speed. One bad feature about metallic top rolls on drawing is the wearing of the shoulder, allowing the flues to go too deep, causing the end to get slack between front roll and calender rolls and allowing the sliver to go through the trumpets in lumps. As soon as this is discovered the rolls should either be repaired, or replaced with new ones. This can be remedied for a long time by changing the front top rolls from one stand to another. This is something that can not very well be taken care of by the compensating gear, owing to one end running slack and the other tight.

We now come to the slubbers. If we deliver the sliver to the slubbers in a good and even condition

we will have very little trouble producing an even slubber roving, provided we kep the steel rolls clean and have good top rolls, and keep them well oiled and cleaned, and run the proper tension. This also applies to intermediate and fine frames. Right here I want to say a few words in regard to tension on intermediate and fine speeders. You can exercise the greatest care in all former processes and deliver your work to fine frames in perfect condition and then spoil it all by not having the proper tension. A good carder will know how to gear his frames to get the proper tensions and when he has them right he must not allow his speeder tenders to take up and let off on the tension, as we know they can not do very much damage by letting off on the tension. But if they are permitted to let off on it, they are sure to take up on it. I always impress it on the frame hand's mind that it is just as necessary to get the section man when his tension needs adjusting as it is for any other reason.

Now, if roving is delivered to the spinning in good even condition, a competent spinner will not experience any trouble in getting an even yarn. The chief causes in spinning for uneven yarn are dirty steel rolls, bad top rolls, dry rolls, worn bolsters, worn spindles, high speed, spindles out of plumb, gears improperly set and long drafts. Excessive draft is equally as bad in card room as in spinning room. Long drafts are one of the chief causes for uneven yarn in any of the processes. This is something that must have very close attention and must be arranged as short as possible in all processes. Many mills today are producing uneven yarn by trying to keep down the roll covering cost, which is in the writer's opinion very poor economy.

In conclusion, I want to say a few words on efficient organization. You must require every man to run his job. It is impossible for any overseer, or superintendent, to produce good yarn without the cooperation of all concerned. Each and every one connected with the different processes must do their part, and it is the duty of the overseer to see that each one does his part, and when anything comes up to produce bad, uneven yarn get busy and locate the trouble and remove the cause. He can't do this by sitting in his office and talking the matter over, but he must get busy, find the trouble and remedy it.

## Number Forty-Four.

By J. A. ADAMS, Fitzgerald, Ga.

I would lke to say that this is a broad subject and one thing that has been somewhat neglected in the Southern mills. The question is, are we doing what we know ought to be done? There is no one thing that causes uneven yarn.

Of course we will have to start in the opening room, which plays a very important part. We should have two opening pens and keep one day's run, properly mixed, ahead. The staple, of course, depends on the class of goods being made, but in all cases we should try and get as near the same length staple as possible for the goods we are making. Keep the hopper from one-half to two-thirds full at all times and see that the breaker fans are pulling both sides alike. At the intermediates and finishers, see that laps are kept on the aprons properly. Evener belts should run about 4 inches from the large end of the cone, so if one lap should get through, it will have lee-way enough to take care of it. The laps should be weighed (by the yard) three or four times a week, to see whether the aprons are slipping, or if there is anything else wrong.

Now we come to the cards. Every man has his own way of setting them. Of course, they should all be set alike for the class of goods being made. Break the ends down when stripping, and then wait until the card fills up before putting them back. This is one thing that is neglected more or less. There is no setting, within the bounds of reason, that will make as great a difference in the weight of the sliver as this one thing.

The drawing frames, the worst of all, come next. There is more bad work made on drawing frames than

any other process in the mill. All the inexperienced help as a rule, as well as the cheap help, are placed here to get their experience, and when they come to a singling or a heavy sliver they let it pass on through, if it will. The overseer should go over his drawing every day to see if all the weights are on, and that it is free from roller laps, top and bottom. Uneven weighting will cause great variation. Drawing should be weighed twice a day, each end separately, and the variation noted. Rolls should all be set alike. Help should not be allowed to set in all their cans at once, as this will cause a great variation. The full cans will weigh three to five grains heavier than when they are about empty. The calender roll change gears should be looked after and changed whenever needed. The ends should be run just light enough not to sag, so that they will not double and go in, causing a lump.

Crooked rolls are bad things and will cause bunchy work. Slubber rolls should all be set alike, the leather rolls in line with the flutes of the steel rolls. Chokes should be kept off. Have plenty of rolls, and have them oiled well. Creased rolls will not produce even work.

The tension has a great deal to do, with even roving. Excessive twist is a bad thing, as it will cause the ends to stay up, even when they are too light. The twist runs to the weak part, and when it gets to the next process, the smallest place is the hardest to draw, and the middle rolls will steal from the back ones, causing varation. Cotton packed in the clearers is a bad thing and will make heavy roving. Loose jionts, and dry rolls will cause bunchy roving and yarn. The weight levers on spinning should all be alike, so as not to have more weight on one roll than another.

There are a lot more little things, too numerous to mention, that make uneven yarn. If we would all put into practice what has been said and what will be said, there would be a great improvement in Southern mills, I have had 27 years experience in Southern cotton mills and have worked in about 25 mills, all the way from 15 minutes to 7 years, and am sorry to say that a great many men are not doing as well as they can do. A little personal attention goes a long way. I am not throwing stones at any one. I think almost any good mill man will agree with me. I hope we will all derive some benefit from this contest.

## Number Forty-Five.

By C. H. LOCKMAN, Fitzgerald, Ga.

This subject, the "Cause and Prevention of Uneven Yarn," I consider one of the most, if not the most important matter pertaining to the manufacture of cotton goods. If there could be an absolute remedy found to stop making uneven yarn it would benefit almost all mills, for all that I know any thing about make more or less of it. Of course the fiber can be damaged a great deal before it gets to the mill. In growing, picking and ginning, but I will not take up the causes until we reach the pickers. I know that when I say the pickers will cause it I will meet opposition, but I say it just the same, and believe I can prove it. I know we are supplied with eveners on our pickers to take care of thick and thin laps, but you can throw a lump of cotton behind a finisher picker and you will have a thick place after it passes through. On the other hand you let a lap run out and you will have a thin place. You may not detect it, but weigh it and you will find out.

C. H. Lockman
Fitzgerald, Ga.

We will pass to the card. I claim the card will make this uneven yarn by throwing too much trash and motes into the good cotton. Another way is for part of the sliver to be running on the floor while the remainder is going into the can. This will be light weight sliver and I see no way in the world to remedy it.

We now come to the drawing frame. All the machines up to now we have a chance to double and kind of even up the thick and thin places to a certain extent, but can never fully repair them. I suppose the uneven yarn that is to be discussed in this contest is what is commonly known and termed among mill men as thick and thin places alternating with each other every three to six inches, and it is made on drawing frames, slubbers, intermediates, speeders, jack frames and spinning frames. And the cause is most always some defect in the running of the leather or steel rollers. When you state the cause of one of these machines you come very near stating them all, because what causes thick and thin places on the drawing frame will cause it on any of the succeeding frames.

Take the drawing frame first. Lint, clearer waste, and extra sliver or any foreign matter passing through the rollers will make a thick place in the sliver that can never be remedied. Let a sliver break and the machine fail to stop, which is often the case, or the drawing boy fail to take out the roving, which is also very often the case, and you have a thin sliver that can never be remedied. You can fail to get the gears set as they should be and make uneven yarn. A bent steel roller will make uneven yarn.

We now come to the slubber. There are many things to cause uneven yarn here, but I will only name a few. A bent steel roller, a dry top roller, front steel roller running faster than top roller, more weight on some rollers than others, some fingers wrapped more or less than others, where the operative is allowed to monkey with the tension and run his ends tight and slack as the traverse traverses, lint and trash running through on the sliver, what is known as a half singling. All these things will cause uneven yarn. These are the most principal causes on slubbers, intermediates, speeders, and jack frames.

The spinning frame will make uneven yarn by allowing a leather roll to become dry for want of oil, running a bent steel roll, having your gears binding on your steel rolls, by letting your steel rolls become dry and retard their speed.

I have endeavored to give you a few causes of uneven yarn being made in the manufacture of cotton goods. I am satisfied there are many more causes, as what I have given you is just what has come under by observation.

Now, the next part of this subject is the prevention of uneven yarn. Well, it does look to me like that if we all knew the causes we could very easily prevent, but as I said in the beginning, I know of no mill that is preventing, as all I know anything about make more or less of it. So that proves to me beyond a doubt that there are some causes we haven't found yet, or at least we all haven't found them. Maybe after this contest is over we will all know how. So the only prevention I can give you for uneven yarn is to stop the causes, and if the causes I have given you are correct and I have found them to be in my experience then if I will stop these causes and keep them stopped, and stop any and all other causes that will make uneven yarn and keep them stopped, then I have solved the problem of preventing uneven yarn. And so long as I keep these causes corrected and the machines and help going right I will never have any more uneven yarn.

## Number Forty-Six.

By E. L. GOBLE, China Grove, N. C.

The cause and prevention of uneven yarn is a vital question and the causes start back at the cotton gin. It will be found that if the cotton is ginned while it is too damp, the gin saws will cut the staple and make it nappy and lumpy and on being carded, it will be found to go through lumpy and very uneven.

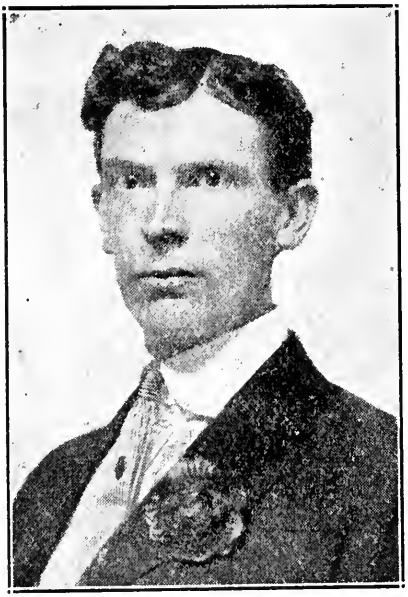
**Opening and Mixing.**

Opening and mixing are most important things in making even yarn. Cotton should first be bought as near one grade and length as pos-

sible. When opened in the opening room, it should be graded as it is brought in and as many bales as possible prepared for mixing at one time, say from 3 to 5 bales. Then take quantities in proportion, from each bale for mixing, and as much as one day's run should be opened, using the cotton from the top of the pile to the bottom. Keep the hopper only about two-thirds full. Eveners should be very closely looked after and kept in good condition, and the ounce lap should be just as light as will keep up well.

**Cards.**

Cards should not be overdrafted nor the doffer speed too high. The setting of cards is a very important problem and should be looked after by an experienced and careful man.



**E. L. Goble**
China Grove, N. C.

They should be set even at each end. Sliver is very often strained by the cans packing under the coiler heads too tight.

**Drawing Frames.**

The drawing frames are as important a factor in cotton manufacturing as any thing else and they get the least attention of any machine throughout the mill. For good, even work, there should be a doubling of six and a draft of one inch to roll of sliver, making six inches draft. Rollers should be taken out and top and bottom ones scoured once a month. Every journal should have the same amount of weight and it should be seen that the calender rolls do not take the sliver from the delivering sliver rolls fast enough to stretch it. Very careful attention should be given this. The stop motions should be very carefully looked after and set so as not to make any singlings. Roller journals should be very carefully oiled, as lack of oil will cause thick and thin places, which will go through the rest of the remainder of the processes of manufacture. The clearers should be kept clean. Keep rollers adjusted to suit the length of staple being used, as the poor setting of the rolls frequently causes uneven sliver which the slubber does not take out. Slubbers should be set so as to build in proportion to the let-off of the tension, so as to be perfectly uniform until the bobbins are full and knock-off, otherwise the roving will be stretched and thick and thin places made.

Rollers must be closely looked after. Determine the average length of the staple being used and set the rollers one-sixteenth wider than the length of the cotton, being careful to have the leather rolls directly over the steel rolls. If possible, it is best to keep up a 3 1-2 inch draft, but if hard to keep up with in the next process, make it a draft of 4 inches, not using any more twist than it takes to hold the roving up and turn the bobbin in the creel without making any stretch. Clearers should be kept clean and rolls well oiled. See if all bobbins are the same in diameter, for if different sizes are used it will cause uneven roving. Do not draft over 5 1-2 inches for even work and do not allow speeder tenders to let off and take up tension, for if they do so, there will be stretched and uneven roving.

Let twist be governed by the stock being used and be careful to put in enough so that it will not stretch in the spinning frame creels. Roving being too slack in the creels, or the skewer gathering waste around the bottom will cause uneven yarn.

**Spinning Department.**

This department has to take the stock just as it comes from the card

room, good or bad, and with the roving coming from the card room in perfect condition in every way, then the spinning, with proper attention to small matters will deliver a good smooth quality of yarn. A few of the little things to watch are: First, the draft and twist. Twist should be governed by the stock being used, the quality of yarn, the atmospheric conditions and several other things. The draft should be standard according to staple of cotton. For single roving, a draft of 7, for double roving, a draft of not over 11 for good, even, smooth yarns.

Frames should be leveled and lined and spindles plumbed, top and bottom, once a year. Guide wires should be set directly over the spindles. Have all draft and roller gears set properly, as oft times the crown front roller, or draft gear will ride the other a tooth once in a while, causing thin places in the yarn. Rollers should be set one-sixteenth wider than the length of staple being used. Rollers must be oiled as often as twice a week. Spindles must be well oiled about once every three weeks, and about once every six months, oil them with spindle oil mixed about one-half with lump oil, as this will cut loose all gummed and dirty spindles. See that the caps on the bases for holding the spindles down are kept on. If they are not, the band will pull the spindle up and make a bad bobbin. Make bands weigh 120 to the pound. Use roving bands, as these will fall off before making soft yarn. Do not use too heavy or too light a traveler. One too light will let the yarn whip against the separator, while one too heavy will strain the yarn and cause it to be weak. Travelers should be examined quite frequently to determine whether they are worn sharp. If found in this condition, break them off and put in new ones. The roving creels should be cleaned and oiled twice a week.

See that the trumpets are clear of lumps. It is very important that the roving guide traverse works properly and traverses three-fourths the length of the roller. If the traverse is standing, the yarn will be found to be lumpy, thick and thin, and very weak.

We will find that if the product is treated right in the carding and spinning departments, the other processes of manufacture will have less trouble and produce much better goods.

## Number Forty-Seven.

By E. L. SHERIDAN, Commerce, Ga.

Cotton should have time to mature well before it is picked. The gins should be properly set and the knives should be kept sharp. Cotton should not be ginned wet, or too green. If knives are not properly set and kept sharp, they will pull the staple or fibre from the seed instead of cutting. This will break the staple and nap it, which will cause uneven yarn.

The cotton buyer must have a standard grade and stick close to it. If he buys a 3 and then a 10, to try and balance the prices, then you have two extremes of staple. When these bales are mixed, which is bound to be done, it will certainly cause bad yarn. The cotton should come from the same section of the country, or as nearly so as possible, as different soils will cause the cotton to mature differently and will produce different lengths of staple. Some of it is hard to draft and some easy. All of these things should be closely observed to prevent uneven and bad running work.

The cotton should be well mixed in the opening room and fed in the hoppers regularly, not too full, nor too empty, say two-thirds full all the time. The beaters should have the same speed on all of the breakers and not too much speed. The majority of the mills are beating the cotton too much. The air current should be the same on all of these machines. The grid bars should all be set alike. In other words, what you want on these openers, intermediates and pickers, is uniformity all the way through. The aprons should be free and easy to run, and be sure the evener works freely. There should be nothing to cause the cotton to hang or drag. This will cause thick and thin places in the lap. The laps should not be allowed to leave the picker room if

there is over one-quarter of a pound difference in them. If these machines are not set up to do the same work, one will clean its lap better than the other, then the card will clean them both and you have one light sliver and one heavy. If this room starts it wrong, it is bound to be wrong all through the mill.

Cards are machines that should be looked after very closely. The man who sets these machines should be a very painstaking man and he should never be hurried when he is setting up a card, and should not leave one little thing until he is satisfied he is right. These machines, like all others, should be kept clean and well oiled. The card hand should be taught not to let any singling or doubling leave the card. If he is required to splice it, break off half of it on each end and not let the splice be larger than the regular size. The clothing should be kept in first-class shape and tight on the cylinder and doffer. The licker-in should be kept in good condition and not allowed to run with saw broken off or bent down. The front of the card should be wiped off instead of fanned off. All of the above faults will cause unevenness and bad running work.

Drawing frames have mighty little attention paid to them. Some say they do not amount to much. Well, it amounts to this: When 1 inch of cotton goes in and comes out 6 inches, it is mighty easy to spoil the work. The rolls should be properly set to suit the stock and staple. It is not worth while saying how far apart the rolls should be, for the different staple and light and heavy work require different settings. The trumpets should be set as close to the calender rools as possible, for the further apart the trumpet and calender rolls, the longer the stock is between these two points. This will have a tendency to stretch and break the staple.

The knock-off motion should be very closely observed and kept free and easy to work. The weight must be the same on both ends of the top rolls. The rolls should be cleaned every week and all rough places polished, I have seen drawing frames that stretch the work between the steel rolls and the calender rolls. This will sure ruin the whole thing. The help should be taught to place the drawings at the proper place and not try to throw the end of the drawing up to the rolls and then start the frame and keep tossing it up until it clatches in. This is very frequently done and it will cause uneven work.

Slubbers and other fly frames have their part in making uneven yarn. They, like all other machines, should be kept clean and well oiled, especially. A good time to oil the rollers is every time they need it and not let them get dry. The steel rolls should be cleaned twice a week. Just a little lap on them will cause a lot of bad, uneven work. The leather rolls should be watched very closely and do not allow bad ones to be used. These machines should be lined and level at all times, especilaly the rollers. If the rolls are not lined and leveled, they are so long that the will jump and quiver, causing chaffed and uneven work which will not be detected until it gets to the spinning frame.

The tension is a very important point in getting even work on the fly frame. It should not be too tight or too slack, and should be very carefully looked after. No one should be allowed to take up on the tension with the hand wheel. When this gets wrong the fixer in charge should be notified and he should change the gear. I have seen the frame hands change them to suit themselves, and they will always run them too tight. The lay gear should be changed to suit the hank roving and not laid too close on the bobbin, or not close enough, as either one will cause the roving to be stretched at different points. The tension is something that should be looked after all the time from the superintendent down. Too much attention cannot be given this one thing. Frame hands should be taught not to lap the roving over while creeling, nor just let one strand of roving run through. Carelessness here causes a lot of uneven yarn. The roving traverse should be in good working condition and not allowed to stand at any one point only long enough to change. Roving trumpets should be clear of chokes at all times. The roving skewers must not be allowed to become blunt and hard to turn. The bobbins should be uniform in size and be well cleaned before doffing. The

flyers should be clear of chokes and all rough places polished smooth. The fingers should be smooth and easy on the roving. All of these things will cause uneven yarn if not attended to promptly, and they should be closely looked after. An excessive draft here will cause uneven yarn. Slubbers should not draft over 4.50, intermediates 5.75, speeders 6.75. Less draft is better.

We all know that if the roving is not even, we cannot make uniform yarn on the spinning frames. These machines have no eveners. Suppose we have good even roving to start with. Then we will produce an even yarn if the spinning frames are properly set and kept up. The first thing we would set in the roving and see that the roving skewer is all right—not too blunt nor too sharp. Then with the roving set, see that it is not out or broken. See that the roving trumpets are clean and free of burs or dents, and that the roving traverse is running its full stroke and does not hang on its change. Then see that the rolls are clean and good and that the top and bottom ones are both properly set for the staple we are running. They should be set just a fraction over the length of the staple. Then see that the proper weight is on all rolls. Don't let the lever get down on the weight board or get them too high. About 2 inches is all right for them. Now see that the rolls are well oiled. If they are dry they will cause choppy and uneven yarn. The front rolls should be set to press against the front part of the roller bar. If this roll plays back and forth it will allow the roll to bite off too much, and this will make uneven yarn. Fluted rolls will cause uneven yarn. They should be kept out. Too light or too heavy a traveler will make bad yarn. They should be kept clean. If the cleaners are gone, have the spinners take the corner of their aprons and hold on them. That will knock the chunks out. Do not let the spinners lap the roving too far when creeling, or set it down too hard. This will bruise up the skewers and break up the sets and stretch the roving. Do not let spinners blow or fan off guides or back, as this will cause uneven yarn. Do not draft too heavy for it makes uneven work. You will find that by drafting some between the back and middle rolls that you will get smoother yarn.

There are a lot of things that have not, and will not be mentioned, that will cause uneven yarn. Uniformity all the way through the mill, with oversers and others in charge trying to make the work good for the next man, will help more than anything else.

## Number Forty-Eight.

By H. B. McABEE, Laurinburg, N. C.

### Picker Room.

There is so much said about uneven yarn that it is impossible for one man to suggest all points. It might be caused by neglecting the picker room. The picker room is even yarn that it is impossible for a very important place. There are so many things said about pickers that I don't know where to begin. Most people try to crowd the cotton through too fast and expect the cards to do the rest, but the cards cannot do what the pickers are intended to do. You must give the cards a chance if you want them to do their part. Now, Mr. Overseer, I want you to see that your pickers are doing their part.

### Cards.

Cards are more important than any other machinery you know, and if you do not get them right, you cannot expect to get even yarns. Of course you will have to keep them right, and I might tell you how to set a card, but it depends altogether on what you want to make, and it will have to be set and drafted right and all the lumps kept out if you want to make good and even yarn.

### Drawing.

Drawing frames are most important pieces of machinery and you have to have your rollers set according to what staple of cotton you are working. Your draft must not be too long, not be over the doubling or less the doubling and well kept to make good and even yarn. Your leather rolls must be kept clean and varnished with the best varnish you can get. If you have metallic rolls you must keep them very clean to make good even yarn. Suppose you have a 6 draft

on your first drawing and a 4 draft on your slubber, a 5 on your intermediate and a 6 on your fine frames

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and a 12 on your spinning. Suppose you have one inch of doubling on your first drawings. Then it will give you 1,440 yards of uneven yarn, so you see that it won't do to make doublings or singlings and that is what makes bad numbers and bad running spinning.

**Roving.**

Roving machinery is another important piece of machinery. Leather rolls must be covered with the best leather you can get and sized well, both ends must be the same size. Your steel rolls must not have loose joints in them, and your draft must not be over from 6 to 7, if you want good even yarn. Your rolls must be set according to the staple of cotton you are using. Lost motion in your spindle shaft causes uneven yarn. Taking up and letting out on your tension causes uneven yarn. The tension is governed by what hank cotton you are running, the twist you are putting in it and the cotton you are using. Tension is a thing that you must be governed by the climate and the temperature and the make of machinery you are using. If you look after the little things you can prevent them from growing to be large things.

**Spinning.**

Spinning is the all-important thing. You must have no bad seams or lumps on your rollers and both ends must be the same size and oiled with good oil. See that no oil gets on your leather rollers and see that your spindles are properly set and plumbed and leveled at the bottom and top. See that your frames are leveled and lined. See that your thread guides and rings are set right and keep them cleaned for all these things causes uneven yarn.

## Number Forty-Nine.

By W. J. JENNINGS, Gibsonville, N. C.

The subject of the "Causes and Prevention of Uneven Yarn" has been very thoroughly discussed and very helpful to all who have been so fortunate as to read what has been said. There are a great many of us who cannot make our work as even as it is our desire to on account of certain conditions that are beyond our control. But the subject is a very important one and one that every superintendent is familiar with to a limited degree. It is every one's intention to make the very best yarn that is possible to produce under the conditions that he is laboring under.

The first subject to take into consideration is the opening room, which in my estimation is the most important. Where the room will admit it is best to open enough cotton for a whole week's run at a time and throw this cotton up in a large pile, taking some from every bale that is opened and make a layer the full extent of the room. As soon as one layer is made, go back over in the same manner until all of the cotton is thrown up. Then when this cotton is being run begin at one side and take it from the top to the bottom, cutting down as straight as is possible to do and in this way it will get thoroughly mixed. In feeding the breaker lapper it is best to keep the hopper as nearly the same at all times as is pos-

sible, for if allowed to vary in hopper the laps will vary, and this will be a start for the uneven yarn, but if it can pass the breaker in good shape it will be so much the better.

All fans and air shafts should be kept clean and free from foreign matter so as not to retard the cotton in its course. The next machine to consider is the intermediate lapper. Now, if the breaker has done its work properly it is much easier for this machine to do its work. The intermediate has an evener on it and it will naturally do better work than the breaker, but admitting all of this it is best to see that the breaker is properly handled and then the intermediate lapper can and will do better and more even work than it could otherwise. The next machine to consider is the finisher lapper, if this machine gets its work from the other machine in good shape and it is in good working order it will make good work itself, but if the other machines have failed to make good then, as a natural result it will not make as good as it should. The eveners on the intermediate and finisher lappers should be kept in good shape and then know that they are working well. Then there should be no visible reason why the machines should not turn out even, or as nearly so, as could be expected. These machines should be well closed in next to the floor so as not to allow any more air to come in contact with the course of the cotton than is really necessary.

It is good policy to take down the eveners every week or two and clean them up and keep them properly oiled. If they are thus treated they will do very nearly the work that they are intended to do. Now taking for granted that the lappers have done their work well, we will pass on to the cards. They are like a spinner placed in between the carder and weaver, and has to take it whether it is right or not. If it is right, so much the better, but if wrong then there is more talk. Cards should all have as near the same treatment as is possible to give them. They should all be cased in good all around the floor so as not to admit an air current under the card. This will interfere with its course and will cause the card to throw out too much waste and will make the sliver on this card lighter than on one that does not have the air current to contend with. If all machines up to the cards could do their work right then the cards would do theirs in the same way. Very often when there is a presence of electricity in the card room, one side of the sliver will fall down and run for some time and then the tender will come along and put it up, some times not taking out the light work that has passed in to the can and again we have started an uneven work. It should be every carder's desire to eliminate every bit of singling possible, yet it will get by him and as a result gets bad work ahead of him.

We will now look at the drawings a little, I think that we can make more even work on the mechanical stop than on the electrical stop. Both should and will do their work well if in good shape, though the electrical, in my opinion, will allow light work to pass over and the mechanical will not. Drawings should be drafted up as light as is possible to do. The fluted rolls should be kept well cleaned and where metallic rolls is used they should be taken out and cleaned as often as possible.

We will now pass on to the slubbing, intermediates and fine frames. Now all know that these machines have an important work to do and should not escape our attention. These machines should be kept in good shape and well oiled. They should be properly drafted and if they have received their work in good shape and are in the proper shape they will make good work.

We will now pass on to the spinning-room and there we can find out whether our work is even or not. If the carding room has done its work well and has made the proper hank roving for the numbers being spun and the spinning is in good shape, we will look for good yarn and if either is lacking it will be different. The rolls on spinning should be oiled as often as is needed and kept well picked and not allowed to run sluggish, as this will cause the yarn being spun on this roll to be larger than one that is running free. Spinning should not be flapped off or blown off while running as lint will get on the yarn.

Now, last but in no ways the least, the subject of oiling must be looked into a little. All machines should be kept well oiled and it is the overseer's duty to see that this is well done for it not only makes better work and more even work, but make the life of the machine longer.

## Number Fifty.

By E. F. ANDERSON, Clinton, S. C.

In discussing uneven yarn, which has given all carders more or less trouble, we start at opening room. We must have as near one staple cotton as we can get. Have your cotton opened up in a pile to run a day ahead. Don't have your laps too heavy on your breakers. Don't allow your laps to run singlings on your intermediate. Set your beater to the thickness of a two foot rule. Keep all laps off of feed roller.

The same rule on finishers as on intermediates for good work.

Now don't allow your finisher man to let his laps vary over one-fourth pound each way on your finisher laps. Go and weigh after your finisher man every few days; it will make him careful. Keep eveners in good working condition. Keep good cone belts on eveners. Don't allow section men to put buckles in cone belt. Have your laps weighed once a day on intermediates. Keep all pickers well oiled and cleaned. Keep all gears set up as they should be. Now we have a good even lap up to our finisher.

Now to the card. First, have your cards properly ground and set up. When the writer says "ground" he means, to be sharp so it can do its full duty. When he says "card set up" he means, set from top to bottom.

Now a few things will cause uneven card sliver. When putting on laps, if you lap them over too much it makes thick places. In laying down your laps, if you do not lap them enough it will make a thin place. In hauling them from picker room to cards tearing them up, will make uneven card slivers. To allow your cards to flap off will make uneven card slivers. To have your cone set too high or too low, will cause uneven card sliver. To not have the proper draft on cards will cause uneven card slivers.

The writer could say a good deal more on the cards, but as we are limited, will go to the drawing frame, where the writer thinks there is as much uneven work made, as on any other process in the mill.

Now we should have the proper draft. Have your rolls set as they should be. Keep your knock-off motions so they will stop when one strand of card sliver runs out. Don't allow the hand on drawing to start up drawing frame and make singlings. Don't allow your drawing to to be flapped off, as it will make lumpy work. For when you allow your drawing hands to flap off, you will make thick and thin places in drawing sliver.

Have your section man to go over drawing and inspect it twice a day, and see if your drawing is cutting the sliver. Have your clearers kept clean. Have your draw hand to clean rolls once a day. Have section man to clean draw once a week. Have all trumpet holes the same so your sliver will all be condensed the same. Now we have good even work up to the finishers drawing. So far so good.

Now to the slubber. First, have your slubber properly set up. When the writer says "set up" he means all gears set so they will not jar a man off of the floor. Have your drafts what they ought to be; four is a good draft on slubbers to make good even work. Have your top and bottom rolls set as close as you can get them, so as not to make hard ends. Keep your steel rollers well cleaned and oiled. Keep all laps off of steel roller ,that makes uneven work. Keep in good top rolls. Don't allow frame hands to slip in a solid roll in front where a shell roll should be. Have your shell rollers oiled once a week and have all arbors taken out and wiped off when oiled. Don't allow your ends to run too tight. Have your tension gears changed as the weather changes, and as you change cotton. Don't have on too large gear on bottom cone, it will make your ends run too tight and stretch your roving. Have your frame set up, so you will make a good smooth bobbin. Be sure and put enough twist in roving. There are more of us who don't put enough twist in roving, than there are who put too much.

Now to intermediate and fly frames. Have all gears set up in good shape on intermediate and fly frames ,as on slubbers. Don't allow your spindle gears set too deep. Don't allow steps to run dry. Keep all parts of machine well oiled, and

keep in good set of rollers. Don't allow frame hand to run in doublings while creeling frame. Don't let frame hands make singlings and doublings. Don't allow hard ends made on speeders.

Most carders watch hard ends on slubbers and intermediate, but when it comes to making hard ends on speeders they don't many of us watch it as closely as we should. Now watch your tension gears. The writer thinks there are more thin places made by the frame hand taking up these ends than most any other one thing in the mill. If the ends run too slack, the frame hand will tell you about it. If they run too tight, they are not apt to say anything about it. Don't allow frame hands to fan off frames and let lumps go through on roving. The writer thinks it is O. K. to fan off just before you go to doff, and don't let loose cotton go through until after you doff, as you know the spinners always pull off the first half layer anyway.

Just a few more things and we will go to spinning room. Now we have good even work from pickers to speeders. How did we get this good work? By having a good set of help, and them watching their business, we will be able to keep it this way.

Now to spinning room. Keep all skewers in good shape, and guides wiped out. Rollers well oiled, and keep in good set of rollers. The middle top roll should be as good as front roll. Keep all draft and crown gears properly set. Keep all rolls well cleaned. Where flutes are worn, replace them with new ones. Keep all spindles well oiled and well set. Keep all slack bands off. Keep off worn travelers. Keep out all cracked spindles. Keep all spinners from dabbing up ends. Teach them to twist them up.

Now a few things to keep doing—

Keep after your pickers, keep after your cards and keep after your drawing.

Keep after your slubbers and intermediate.

Keep after your speeders.

Keep after your spinners.

And keep after your job, whether the superintendent keeps after you or not.

## Number Fifty-One.

By L. W. KING, Avondale, Ala.

I will try to give a few things that are overlooked by the overseers and that cause uneven yarn. I once took a card room in a mill of 40,000 spindles. The opener was on the bottom floor and the picker room was on the third floor. We did not have draft enough to pull the cotton up and it would break. The selvage on the lap and caused thin places in the laps. I put the opener on the same floor with the picker room, and was then able to keep my numbers closer. At one time I had trouble with my drawing frames and could not get the cans to fill up, so it would run out at the slubber. I changed the speed of my coilers, running them slower, and that helped my numbers. Up to that time the drawing would break back, and a great many times it would stretch the drawing and cause unevenness and not break back.

Another time I had 7 slubbers, 14 intermediates and 40 fine speeders. The intermediates and speeders ran well but the numbers were so uneven. I did not like to talk about them to the spinner, so I went to the slubbers. I found the hands always working with the tension. So I changed the cone gear one tooth and the lay gear two teeth and got the tensin right so I had no kick from the spinner about uneven yarn since. I find that so many overseers look to the second hand to keep the numbers, and I think it is wrong. I always do the sizing myself, and can always tell how the numbers are running.

I could give a number of other things that cause uneven yarn, but I have just tried to mention a few things that we overlook. All I can say is to watch the little things close and keep them straight, and the big things will show up for themselves.

## Number Fifty-Two.

By J. B. Floyd, Schoolfield, Va.

I will start at the opening room. As many bales as possible should be opened at one time. They should be carefully graded to get a staple of an even length and allowed to stand at least 24 hours before using, so that the cotton will become more normal.

Next we come to the picker room. The hopper should be full at all times. The trunk should be carefully watched and the cage in the breaker kept about half full. The beater should be well oiled and free from dirt. The air current should also be watched, so the lap will not be split. Next comes the apron. It should be kept in good condition. The laps should be run two small ones and two large ones, so they will not run out at the same time. The evener belt should work freely, and should be cemented. If a lap split it should be taken off and run over. The finisher picker should also be kept in good condition. The evener belt should run on the center of the cone. The lap should be carefully weighed by a competent man, and if there is a variation of one-half pound, it should be run over. If the laps are left on the floor they should be covered with burlap to prevent the flying lint falling on them.

**J. B. Floyd,**
Schoolfield, Va.

We will now go to the cards. I will not give any rules for setting, but will presume that the card is in good condition. I will just follow the lap. It should not be put up too long before ready for use, or the filling lint will stick to it. The lap should be pieced to the other one just as it is running through the card, and if it begins to split, it should be replaced with another one. When the card is stripped the first part of the sliver should be taken out of the cans. Also, when that line of cards are doffed, the cans should not be all carried to the same drawing frame. The roving at the drawing frame should be pieced in and not allowed to run out one can at a time and the operator should not be allowed to throw the end in, but should lay it in spoon and then take out the sliver that first runs through the coiler. The spoon and stop-motion should be watched to see that they run smoothly, for if the sliver is right here it will not give much more trouble and in the picker room is where the changes should be made. The fly frame should not be changed. The rollers should be taken out and cleaned once a week. They should be oiled and all parts kept clean.

I will take up the next three or four processes as a whole. When creeling, the operative should not piece in too long an end. The gear should be in good condition, and use a medium draft. The cots on the rolls should be carefully gone over and strips kept adjusted so as not to rub the steel rolls. The tension should be changed by the fixer and not by the operatives. The frames should not be fanned off.

In the spinning room, first the spindles should be plumbed, guide wires set, roving traverse in good working condition, saddles kept oiled and stirrups adjusted so as not to rub the steel rolls. The levers should be set level, and the top rollers kept in good condition, back as well as front. A roller that is not fit to run in front is not good enough for the back. The operatives should not fan out or blow out the guides at any time. They should

be wiped out once a day. Roving should be lifted once a day. The top rolls should be gept clean and the top clearers picked twice a day. The gears should be gone over to se that there are no teeth out. Steel rolls should be kept clean and smooth.

I will stop with this. Keep as good men as you can get and pay them for the work and you will get good results.